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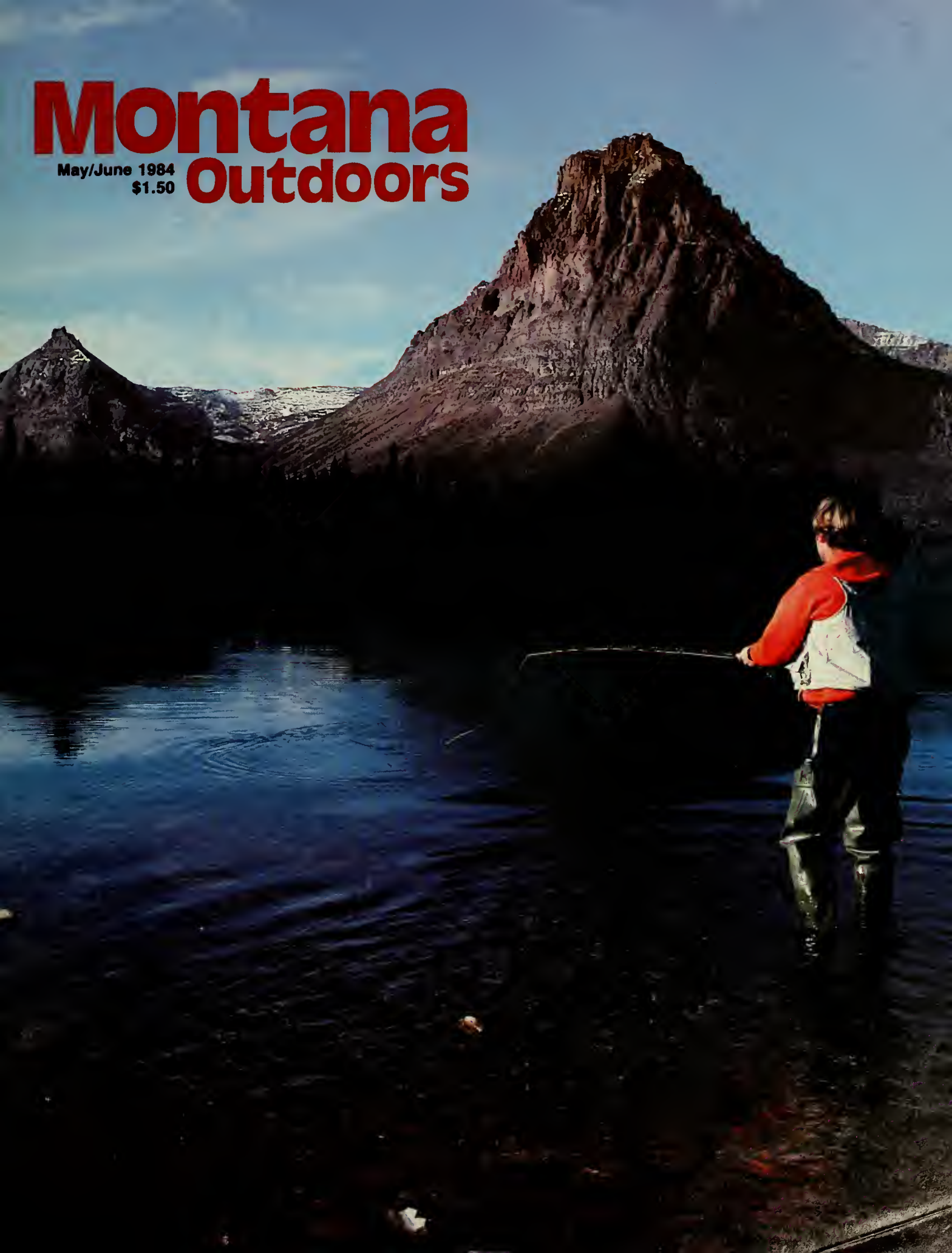

Montana Outdoors

May/June 1984, Vol. 15, No. 3
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Front Cover
When the calendar reaches May, many people begin thinking of vacation and fishing (not necessarily in that order). George Wuerthner's photograph shows both of those: a fisherman, framed by the beauty of one of Montana's vacation paradises, Glacier National Park.

Inside Front Cover
If you encounter a young animal, such as this young sandhill crane photographed by Keith Szafranski, think twice—and then think again—before picking it up and taking it home. Chances are, the mother is nearby and you'll only be interfering with another "mother": Nature.

Back Cover
Allen Wiederrich's camera has made sure the Boyer family—Ron, Chris, and Justin—will have more than a fishing yarn by which to remember their successful day at Intake Fishing Access Site. This site on the Yellowstone attracts fishermen from all over the country who come hoping to snag a "spoon-billed cat," the unusual paddlefish.

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FEATURES

2 Color Them Blue
by George Holton
The term "blue ribbon trout stream" was coined a quarter-century ago this year.

6 Department Lands: Intake Fishing Access Site
by David G. Conklin
At Intake, the rare and unusual paddlefish can be caught with a success that would astound most fishermen.

8 Fish Problems in Glacier
by Madonna Luers King
Park officials are becoming concerned that some of Glacier's fish need more attention.

12 1983 Fishing Records Summary

15 Don't Cuss the Brush
by William S. Platts and Martin Onishuk
Your fishing success depends on it.

18 Look, But Don't Touch
by Vince Yannone
If you see a young animal alone—leave it that way; its mother is probably nearby.

21 Approaching the Mountain
by Greg Noose
Granite Peak, the "King," is more than just a name on a map.

24 Montana Sting
by Bill McKiernan
The investigation, which originated in Montana, broke up one of the largest wildlife poaching rings on record.

27 Hooking Onto Special Regs
by Steve L. McMullin
Special regs can result in dramatic increases in the numbers of large trout.

31 Tapeworms in Cloverleaf Lakes Cutthroat
by Jim Peterson
Worms in fish are unsightly, but they usually don't affect the quality of the flesh.

34 Montana: Crucial Key to Ferret Recovery
by Dennis L. Flath and Tim W. Clark
Wyoming harbors the only known population of black-footed ferrets; however, Montana's potential as a ferret site is excellent.

DEPARTMENTS

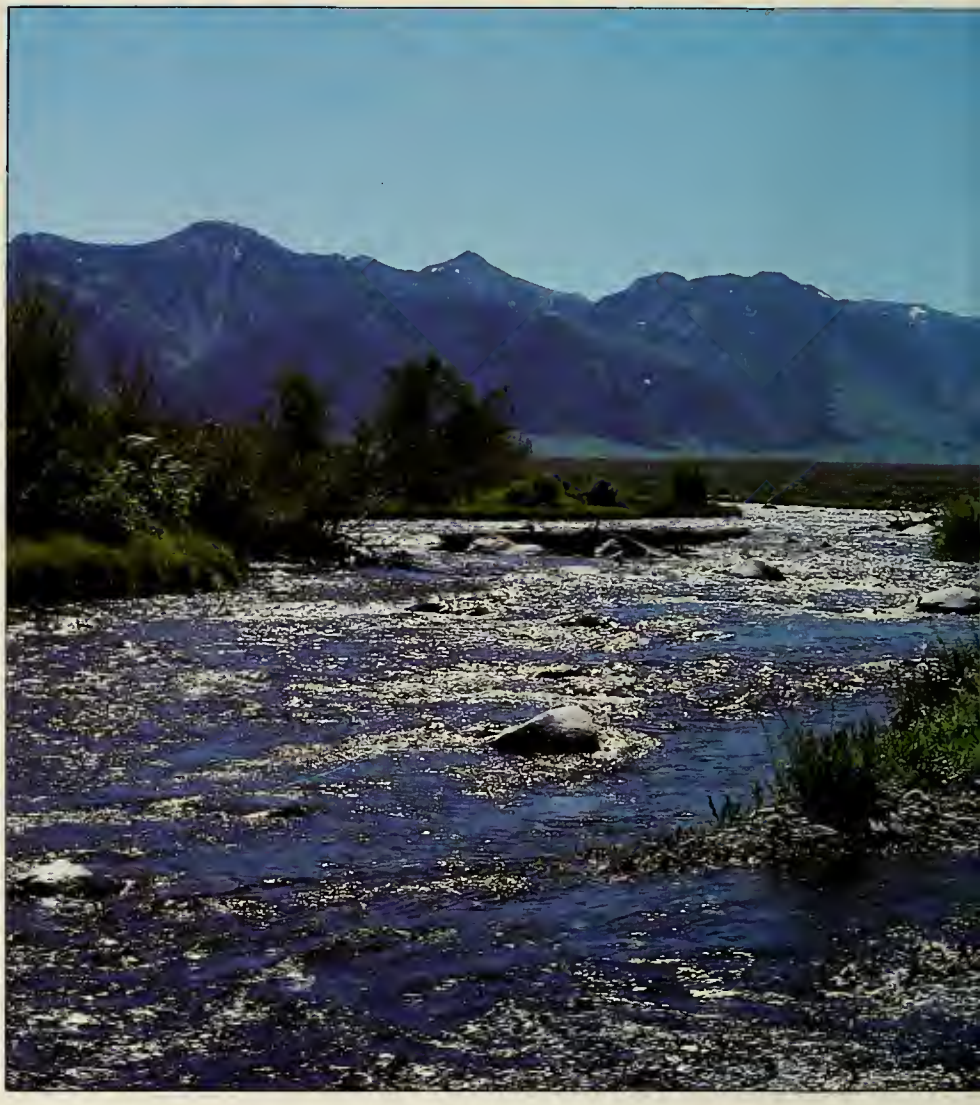
11 The Catchall

17 Contributors

23 Readers Respond

33 Book Reviews

COLOR THEM BLU



The term "blue ribbon trout stream" was coined a quarter-century ago this year with printing of the first Montana stream fishery classification map.

Can you run a grocery store without an inventory—without knowing how much prime rib is on hand and how much stew meat, and the price of each? Not for long. Yet that was the status of Montana's stream fishery management 30 years ago.

Although Montana had boasted of having 20,000 or 30,000 miles of "well-stocked" fishing streams, the claim was largely unsubstantiated. No one could say with authority just how good the fishing was, which streams were best, and which offered the most future promise. Fisheries managers were concerned that this illusion of abundance might lead to a dangerous complacency—after all, with this much fishing water, what difference would it make if 20 or 30 miles were lost each year?

An inventory was badly needed that would allow comparison of Montana's fishing streams and assess the expected contribution of each to the state's overall fishery. Such an inventory and appraisal would be analogous to a U.S. Department of Agriculture survey to determine the amount and location of productive land needed to feed our nation.

From its beginnings in the early 1950s, the project was a cooperative effort between the Montana Fish and Game Department (now Montana Department of Fish, Wildlife and Parks) and the Missouri River Basin Studies of the Bureau of Sport Fisheries and Wildlife (now U.S. Fish and Wildlife Service). Several people from each agency participated.

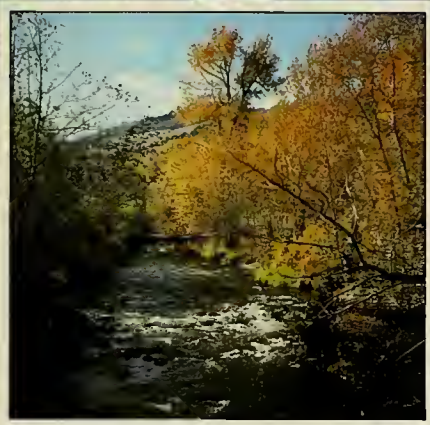
One early approach involved assigning rating figures to indicate comparative stream values. For example, a stream rated 1,000 was considered twice as valuable as one rated 500. The maximum value was 20,000. Assignment of dollar values to major stream fisheries was also experimented with. These concepts had merit, but for one reason or another proved impractical.

In 1955 a committee, chaired by the late Dr. C.J.D. Brown, a fisheries professor at Montana State College (now Montana State University), was formed to explore ideas for classifying Montana's streams. Although department records do not include all the committee members, particular mention should be made of the late Joe Halterman, a Bureau of Sport Fisheries and Wildlife employee who became a driving force in the stream rating effort.

A fisheries biologist and sport fisherman, Joe had worked on or fished essentially every major stream in Montana and Wyoming. He knew, both as a biologist and from angling

by George Holton

GEORGE WUERTHNER



CHRIS CLANCY

The Madison River (top), a classic blue ribbon trout stream, has an excellent rainbow and brown trout population, good aesthetics, good access, and considerable fisherman-use. Lower Tom Miner Creek (inset) is rated Class 1 as it is one of the most important spawning tributaries to the Yellowstone River for Yellowstone cutthroat trout, a "fish of special concern."

experience, what constitutes a good trout stream. Joe worked with the committee in developing a usable method for classifying Montana fishing streams and presented the details at a February 1958 meeting of the Great Plains Fishery Workers.

The method consisted of rating each stream or stream reach for (1) availability (e.g., land ownership; access; and proximity to roads, population centers, motels, and campsites), (2) aesthetics, (3) use (fishing pressure), and (4) productivity (natural capacity to produce recreational fishes). Based on the rating received for each of the four factors, a stream or reach was placed in one of five classes, with Class 1 being best. Although a map was drafted with colors indicating classes, it was not intended as a guide to sport fishing. In fact, a stream with an excellent fish population could be downgraded for inadequate access. Conversely, heavy fishing pressure—repugnant to most fishermen—could cause a stream to be upgraded.

Joe Halterman worked with each Department of Fish and Game district fisheries biologist in applying the rating system to streams in the biologist's district, thus ensuring a consistent approach across the state. Joe also tabulated the results for consideration of the committee, which at this time consisted of Joe, Dr. Brown, Perry Nelson, and me.

In 1959, the Bureau of Sport Fisheries and Wildlife drafted the first stream fishery classification map for Montana and had 2,000 copies printed. Blue—the traditional color of county fair "1st prize" ribbons—was used to highlight Class 1 fishing streams. And thus, a quarter of a century ago, the term "blue ribbon trout stream" became a designation of excellence familiar to fishermen, conservationists, chambers of commerce, and developers.

By 1964 the supply of maps was exhausted. A new committee was formed, with Dr. Brown and Joe Halterman continuing as chairman and coordinator, respectively. Art Whitney replaced Perry Nelson as one of the department members and I remained as the other member. Stream ratings were revised using the same objectives, methods, and criteria as in 1959. Newer, more accurate, information on the four rating factors and stream lengths was incorporated. The Bureau of Sport Fisheries and Wildlife updated the map overlays and in 1965 the Department of Fish and Game had 3,000 copies of the new stream fishery classification map printed.

The most notable change on the new map was the increase in Class 1 streams (those of national as well as statewide importance) from 410 to 452 miles. This was due chiefly to upgrading the Flathead River (from the lake to the North and Middle forks) from Class 2 to Class 1. The Flathead joined renowned portions of the Big Hole, Madison, Missouri, West Gallatin (now Gallatin), and Yellowstone rivers, and all of Rock Creek (southeast of Missoula), in the blue ribbon trout stream category.

Class 2 streams (those of statewide value) totaled 989 miles and were highlighted in red; Class 3 streams (those of value to large districts of the state) totaled 2,412 miles and appeared in yellow on the map. The 3,853 miles included in these top three classes represented all Montana streams deemed to be of widespread value. Yet, this was only a fraction of the boasted 20,000 to 30,000 miles of "well-stocked" streams. There were still thousands of miles of streams highlighted in grey (Class 4, streams of value to smaller districts such as counties), and even more not colored (Class 5, streams of restricted local value or not yet classified). Many of these would be regarded as treasures in states less blessed. But just as rocky hillside farms are not the nation's "breadbasket," these smaller, less productive, streams are not the stronghold of Montana's famous fishing.

With its improvements, the 1965 map became *the* stream rating map and held sway for 15 years. The blue ribbon stream maps served the resource well. They were respected and consulted when water use decisions were made. Wyoming, Idaho, and West Virginia developed stream rating maps based on the Montana concept.

But the 1970s brought a new urgency for stream rating: the energy crisis. Who can forget OPEC's squeeze, the

gasoline and fuel oil shortages, and skyrocketing prices? Fish and wildlife managers were worried that the whole West would be dewatered and reshaped in the urgent quest for coal, oil, and natural gas. An updated and expanded assessment of our streams was needed to ensure that fishery values would be considered as other resources were developed.

Aware of this need, the U.S Fish and Wildlife Service initiated a new stream rating effort, the most comprehensive to date. Montana was one of 11 western states that contracted with the Service to furnish data and a draft map classifying its streams. It should be noted that emphasis up to this point had been on trout waters. With the new rating effort, sport fishes would still be important, but so would "fishes of special concern" (native fishes of all species found in limited numbers and/or waters—see the Jan./Feb. 1980 issue of *Montana Outdoors*). In fact, this new approach would be designed to consider the value of a stream for *all* fishes.

Fortunately, this latest stream evaluation effort began just as we were establishing a computerized stream fishery database—a joint effort between the DFWP and the U.S. Forest Service, with lesser involvement by the Bureau of Land Management. Essentially, the database stores stream survey information collected by field fisheries biologists.

Because I was already involved in developing the database, I became the lead person in the new stream classification effort. Our approach was to enter all the information needed for classification into the computer, and to write a program that would evaluate the data and assign the ratings. Field biologists played a key role—they supplied the information and were instrumental in determining how much weight should be given each attribute. Skilled data processing specialists made the computerized rating system a reality.

In the future, it may be desirable to evaluate such physical stream characteristics as rate and fluctuation of flow, type of bottom, cover for fish, water chemistry, and temperature. But we do not presently have the necessary measurements for each stream. A satisfactory alternative is to "let the fish tell us" how good a stream is.

GARY D. HOLMES

Rock Creek, running across meadows, down a forested canyon, and between rocky bluffs, is one of Montana's most picturesque blue ribbon trout streams—a combination of beauty and productivity.

In the new rating system, as in the previous one, the species of fishes present, the abundance of the various species, and the size of sport fishes are the primary indicators of habitat suitability. This is feasible since nearly every stream in Montana capable of supporting fish is populated as a result of natural distribution, transplanting, and widespread stocking from hatcheries.

Six stream classes were established for the 1980 map: Class 1, highest value fishery resource; Class 2, high priority fishery resource; Class 3, substantial fishery resource; Class 4, moderate fishery resource; Class 5, limited fishery resource; and Class 6, not yet classified. Each stream was assigned to one of these classes for each of the following two criteria:

Criterion 1, **habitat and species value.** Each stream (or reach) was awarded points for species diversity, with emphasis on "fishes of special concern." Additional credit was given spring streams and reaches with high aesthetic value, significant trout recruitment, and local importance for scientific study, nature study, and/or recreation.

Criterion 2, **sport fishery potential.** Each stream (or reach) was ranked on factors similar to those used in the earlier classification system: (1) fish abundance (total weight or numbers and sizes of sport fishes), (2) ingress (legal right of the public to fish the reach or willingness of landowners to permit fishing), (3) aesthetics, and (4) use by fishermen.

The final classification for each stream or reach, the **fishery resource value,** was the higher of the classes assigned for either of the two criteria. This is analogous to a school situation in which the teacher announces there will be two tests and the final grade for each student will be the higher test score. This "higher score" approach solved a problem, in that a mediocre score for one criterion plus a mediocre score for the other would have added up to a good classification, whereas the reach was, in fact, *mediocre.*

Classes 1 through 5 are highlighted on the map with various colors. Blue and red were not used, as they had become traditional colors for rating sport fishing streams. The new map rates the total fishery resource; fishing value is included but so is the habitat value for all fishes, large and

small.

Streams rated Class 1 for sport fishing are still considered blue ribbon streams. The selection process is rigorous. In addition to having the required number of points for Class 1 status, a stream reach must have: (1) 5,000 man-days of fishing use per year; (2) one of the three top aesthetic ratings; and (3) one of the three top ingress ratings. The fish population must be based on natural reproduction and have paddlefish, or have a proportional number of large trout.

Thus, a blue ribbon trout stream is still a blue ribbon trout stream, even though it is not colored blue on the latest map. In addition, some cool/warm water streams with combinations of paddlefish, sturgeon, sauger, walleye, catfish, and burbot (ling) now have blue ribbon status.

Not surprisingly, some differences in stream ratings came about between 1965 and 1980. Over this period, the development of more sophisticated electrofishing equipment and emphasis on stream studies greatly expanded our knowledge. Twice as many stream miles (17,696) were rated in 1980 as in 1965 (8,813).

The seven famed trout streams (Big Hole, Gallatin, Madison, Missouri, Yellowstone, and Flathead rivers, and Rock Creek) that were blue ribbon on the 1965 map also had Class 1 sport fishing potential sections in 1980. All except Rock Creek had length adjustments—some longer, some shorter. Newcomers to blue ribbon trout stream status were portions of the Beaverhead, Blackfoot, Kootenai, and North Fork of the Flathead rivers. When the adjustments were made and the new streams added, blue ribbon trout streams totaled 542 miles—90 miles more than in 1965, but still only 3% of all the miles rated.

Although there were no cool/warm water streams with a Class 1 sport fishery potential in 1965, there were 343 miles in 1980. Also, on the 1980 map, numerous streams or reaches are highlighted solely in recognition of their value as habitats for all fishes, particularly "fishes of special concern."

Classifying streams according to their relative worth has fulfilled its objectives. Those who use or influence streams are advised in advance how these streams are valued. We now have an inventory to remind us that high-value fish habitats are a precious commodity.

KRISTI DuBOIS

The Tongue River is highlighted in two colors on the latest stream evaluation map. Near its mouth it is Class 2 (high priority fishery resource), an example of a cool water/warm water fishery that received a high rating.

Admittedly, this is a complicated system, and certainly not the "last word" in stream rating. But it does represent the state of the art. In fact, in 1981 the regional director for the U.S. Fish and Wildlife Service's Region 6 wrote that "...among all of the 11 similar cooperative agreements with State agencies involved in this stream evaluation project, the most outstanding work has been done by the Montana Department of Fish, Wildlife and Parks...."

Now that the system is computerized, stream rating will be an ongoing process. When the next updating is done, the premium portion of the Bighorn River will be a candidate for blue ribbon status. Because it was not under state jurisdiction in 1980, it was not rated by our system at that time. On the other hand, some streams and reaches that are blue ribbon today could lose this status because of stiffer requirements or new data that show they are either not as good as we thought or that they have declined in important aspects.

By definition, blue ribbon stream status is exclusive. If it is to serve its intended purpose, it must remain that way.

* * * * *

• *Funds for assembling data for the 1980 map were provided by the U.S. Environmental Protection Agency; the Montana Department of Health and Environmental Sciences as part of Section 208 Water Quality Management Planning; and the Montana Department of Natural Resources and Conservation as part of the environmental assessment fee received from Northern Tier Pipeline Co. The U.S. Environmental Protection Agency also provided funds for printing the map, which was done at the U.S. Government Printing Office.*—Ed. ■

Department Lands:

Intake Fishing Access Site

by David G. Conklin

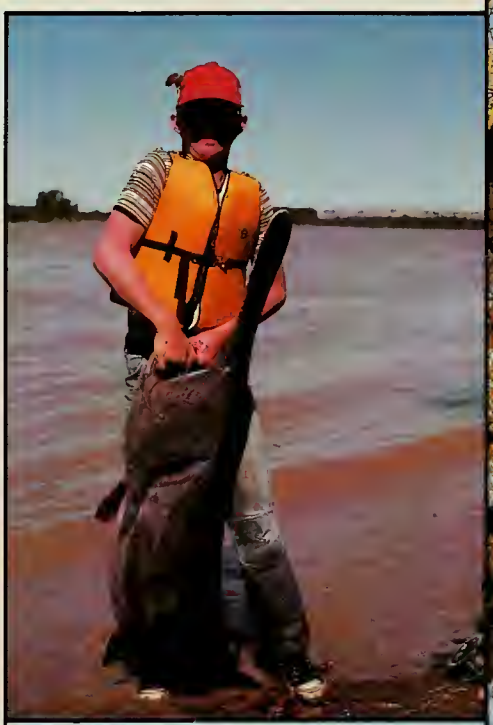
In my mind, I can still see it on that agate-cobble gravel bar a half-mile below the Lower Yellowstone Diversion Dam. It was my first visit to Intake Fishing Access Site, on a hot August day in 1971. Lying there, it looked like a broken canoe paddle, with a surface texture like the inside of a golf ball, but smelling distinctly like dried fish.

It was a paddle all right—not a canoe paddle, but a paddle**FISH.** The snout of a "spoon-billed cat," one of the largest and most unusual freshwater game fish in North America. At Intake, this rare and unusual fish can be caught with a success rate that would astound the average fisherman. In fact, since that day in 1971, over a quarter of a million people have come to Intake to fish and have fun.

Although paddlefish spend most of their lives in Lake Sakakawea in North Dakota, thousands of them swim upstream to spawn when the warm, roiling, turbid waters of the Yellowstone reach peak spring flows in May and June. The mature fish, from 9 to 26 years old and weighing up to 100 pounds, congregate below the irrigation diversion dam. Here, sometimes a thousand fishermen a day attempt to snag and tag their season limit of two of these plankton-eating monsters.

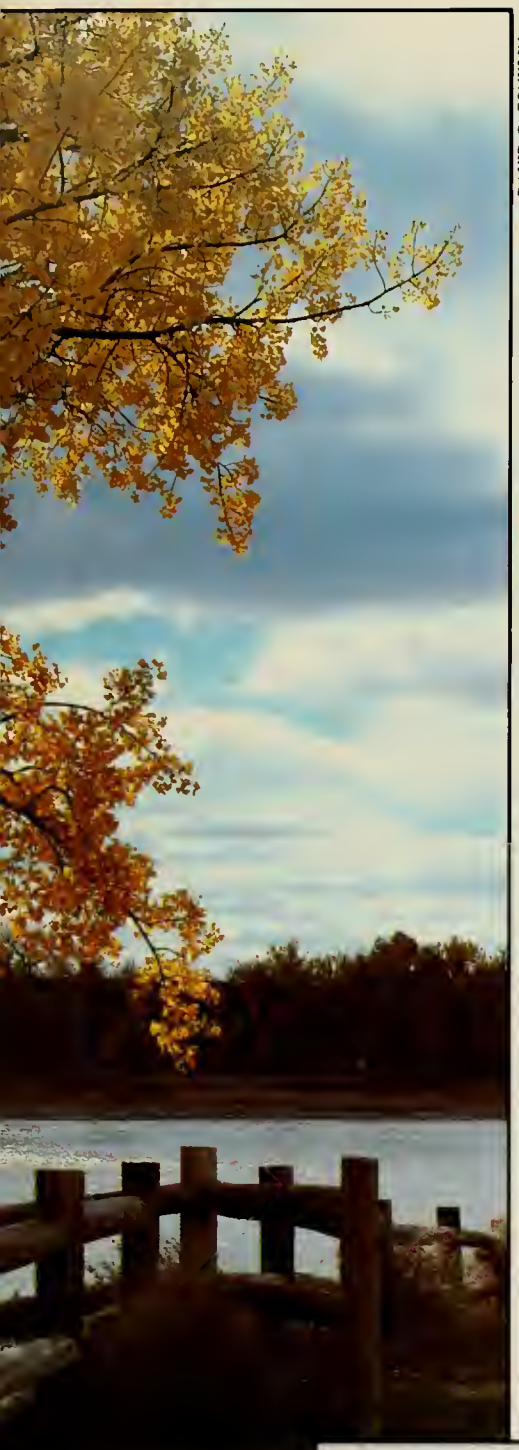
As paddlefishing has increased in popularity, additional management decisions and expenditures have become necessary at Intake. The fishing access site consists of 40 acres of land on both river banks. The land is leased from the U.S. Department of the Interior, Bureau of Reclamation, which also owns the dam site. However, only about five acres on the north bank have developed access, drinking water, parking, and sanitary facilities. Camping is also allowed, with a fee charged to offset management costs.

In 1983, additional land was leased to contain overflow camping that was spreading onto adjacent private hay fields. If Intake's popularity continues to soar, it will be necessary,



ALLEN WIEDERRICH

DAVID G. CONKLIN



DAVID G. CONKLIN

although costly, to develop better access and sanitary facilities on Joe's Island on the south river bank.

Waste management is also an important consideration at Intake. For example, during about two months of 1978, nearly 5,000 paddlefish were caught at Intake. The waste resulting from these fish would equal a string of 14-inch rainbow trout 46 miles long—in case you don't have your calculator handy, that's about 40 tons!

A portable fish-cleaning facility has been set up to help manage the wastes from fishermen cleaning fish, and two steel dump trailers have been purchased with fishing license dollars to remove the waste daily. Modern rest rooms, drinking water faucets, and a beverage, food, fishing equipment, and fish-cleaning concession are also under consideration to replace inadequate facilities as needs dictate and funds become available.

Although Intake Fishing Access Site is almost synonymous with paddlefish, it is also much, much more. Each season brings an unparalleled transformation with it. Early spring's still-naked cottonwoods usually find three or four serious fishermen at Intake every day, catching delicious 3- to 5-pound sauger and walleye which swim up from Lake Sakakawea to spawn. In fact, the number of spawning walleye in the Yellowstone River near Intake has been estimated at over 2,500 per river mile (see "Search for Sauger," *Montana Outdoors,* July/August 1981). Patches of wild asparagus provide another productive pastime.

The snagging of the first paddlefish soon after the May 1 season opening signals the beginning of an almost carnival atmosphere, bringing trucks, trailers, boats, and campers, from all over Montana, other western states, and even from the central states. They come to shake off the remnants of last winter's cabin fever and to take advantage of eastern Montana's handsome spring weather. As with most carnivals, it is an exciting and crowded place, but the department's site maintenance, fish management, and law enforcement capabilities are overtaxed. Many people bring trailers, tents, and motor homes in which to stay, but most often they just fish day and night for the famous "spoon-billed cats." The observant camper can also take advantage of the last of the wild asparagus crop and the best morel mushroom hunting in the region.

When the snagging season ends in mid-July, Intake once again becomes a quiet, almost secret, family fishing and picnicking place. It offers channel catfish and shovelnose sturgeon to the rod and reel or setline fisherman. Warm summer nights are often spent poking the coals of a dying campfire, listening to the sound of the distant water rushing over the dam, or watching the wink of an occasional firefly.

The Yellowstone becomes warm and calm enough by mid-July to become a river floater's paradise. You can see almost every kind of craft on the river, and swimming, wading, and sunbathing are not forgotten. Summer crowds are unknown on this stretch, so caution is always necessary because help may be far away.

Intake Dam itself is a dangerous obstacle to boats and swimmers. It cannot be seen from upriver, and its rocks and rapids have sunk many boats and drowned more than a few people. It is given a wide portage by

continued on page 37

ALLEN WIEDERRICH

This young fisherman at Intake Fishing Access Site has snagged one of North America's most unusual game fish, the paddlefish. The Intake site on the Yellowstone River has something to offer any time of year. Intake Diversion Dam is given a wide portage by smart floaters; this photo was taken during June high water. The waste resulting from fishermen cleaning the huge paddlefish has posed a problem at Intake. Portable fish-cleaning facilities have been set up, a steel dump trailer has been purchased, and other improvements are in the planning stages.

Lake McDonald (photo: PAUL MENARD)

Fish Problems in Glacier

by Madonna Luers King

Overshadowed by the threatened grizzly bear and the endangered bald eagle, fish have never been one of Glacier National Park's major drawing cards. But recent restrictions on the harvest of native species reflect a growing concern by park officials that some of Glacier's fish need more attention or they could join the ranks of the rare.

Two fishes of special concern are the westslope cutthroat and the bull trout. Daily catch limits for these native species have been reduced to two and one fish, respectively. While neither fish is currently in dire straits within Glacier Park itself, the historic ranges of both have been reduced; the westslope cutthroat now occupies only a small fraction of its original range.

Highly sought by anglers, these two salmonids rank as favorites among the nine sport fishes found in the park today. The other species, including brook trout, lake whitefish, and kokanee (salmon), were established through stocking programs dating back to the early 1900s. Although fish stocking was discontinued in the park more than 12 years ago, many of the introduced species still thrive. These introduced species often compete with native fish for food and space, and sometimes prey directly upon them. Gene-pool contamination resulting from hybridization between cutthroat trout and several introduced species has compounded the problem.

Glacier's aquatic biologist, Dr. Leo Marnell, says that genetically pure westslope cutthroat trout (a subspecies separate from the Yellowstone cutthroat once stocked in the park) are found in about the same number of lakes today as they were before stocking programs began—17 of the park's 60-plus lakes. But they have been displaced by introduced species in some waters and introduced to formerly barren lakes in some instances, changes which may cause problems for the population as a whole in the long run. Only two lakes with original populations of westslope cutthroat trout escaped stocking, so Marnell says it's a wonder that Glacier has as many genetically pure westslope cutthroats as it does now.

The westslope cutthroat trout has been lost or genetically altered throughout 90% of its historic range, which covered roughly the western half of Montana, the northern half of Idaho, and small portions of southern British Columbia and Alberta. Marnell believes this reduction has resulted from a combination of factors, including competition from introduced species, hydroelectric development, and general habitat loss. Because of the drastic decline, the westslope cutthroat was placed on the U.S. Dept. of the Interior's endangered species list in 1966. Although it has since been removed from that list, it still appears on Montana's list of "fishes of special concern"—those which, with further adverse impacts on their numbers or habitat, are vulnerable to elimination from the state.

In 1978 scientists designated Glacier's other native salmonid, the bull trout, a species distinct from the Dolly Varden based on morphological and distributional differences. This effectively cut the bull trout's range in half, and recent studies by the Montana Department of Fish, Wildlife and Parks (DFWP) have shown that bull trout numbers in western Montana are lower than previously thought.

Almost all of the permanent stream closures within the park—in the North Fork of the Flathead River area in the northwestern corner and in the Middle Fork area near the southern boundary—are for the protection of bull and cutthroat trout spawning grounds. "Bull trout are extremely

site-selective in their choice of spawning habitat," Marnell explains. "They require very specific habitat types, and they're sensitive to land-use activities that cause sedimentation in those areas."

Clearcut logging, mining, and road construction, even though they occur upstream from the park, can increase the sediment load in waterways inside the park. Increased water temperature due to clearcutting can alter the microscopic plant and animal life that supports fish populations. And then there is the specter of acid rain, which could potentially have the most serious long-term impact on Glacier's aquatic resource, since increased acidity of lakes and streams could inhibit fish reproduction. Some of the known sources of acid rain, like coal-fired power plants and automobile emissions from heavily populated areas, are increasing to the west where most of Glacier's weather patterns develop.

GARY D. HOLMES

Success is the name of the game for this fisherman at Arrow Lake in Glacier National Park.

In the midst of all these threats to Glacier's fishery, the recent fishing regulation changes might seem insignificant. But Marnell, who recommended them after deliberating with the DFWP and the U.S. Fish and Wildlife Service, believes the changes reflect an important philosophical statement. "We're saying that we regard native fish species as important, and that they must be preserved and protected for the future by all means possible."

Marnell points out that present-day park biologists have inherited a double standard from the early days of park management. "We don't permit the harvesting of trees in national parks, nor have we allowed hunting of birds or mammals, or the introduction of exotic bird or mammal species. But no one thought there was anything wrong with stocking the national parks with exotic fish species, or for that matter, taking the native ones out.

"The National Park Service's policy of natural ecosystems management tends to discourage consumptive use of natural resources," Marnell continues. "Park visitors 'enjoy' mammals by simple observation, something that is more difficult to do with fish. Then, too, a literal interpretation of our policies would compel us to consider removing non-native fish populations. Technically, this could apply to the kokanee that now migrate up McDonald Creek every fall to spawn. But this would adversely affect the endangered bald eagle, which now depends on the spawning salmon for fall sustenance. There are no easy answers, since everything is related to everything else."

Marnell explains that the stocking programs got under way at a time when much less was known about natural ecosystems. He cites the early days of predator control and the overzealousness of forest fire control, noting that we now understand that predators are important in the food chain to maintain a balance, and that natural fires are a necessary part of forest renewal.

The realization that something might be amiss with park fisheries programs gained recognition after World War II, when biologists began to document declines in native species populations. Changes were made in stocking programs throughout the National Park System in the 1960s; by 1967, only cutthroat trout were being stocked in Glacier's lakes. In 1972, stocking was discontinued altogether.

Even though administrative attitudes toward stocking and the Glacier fishery in general have changed over the years, Marnell notes there is still a long way to go in changing public attitudes. "Some fishermen still don't understand why it's even necessary to be concerned about native versus introduced species of fish," Marnell says. "But every time a species is lost, everything else connected is brought that much closer to extinction. Besides, if a fisherman looks at a situation strictly from a fish-catching point of view, a pro-native attitude is actually the most sound. The native species have evolved over thousands of years to survive in certain types of habitats, and they have the best chance of being enjoyed by successive generations of fishermen. In Glacier, the westslope cutthroat and the bull trout are ideally suited to the environmental conditions, and they are our best long-range hope."

Marnell doubts that some of Glacier's waters, such as Lake McDonald, will ever be wholly rehabilitated. "Lake McDonald is an ecological horror story," Marnell says. "For 50 years it was virtually the kitchen sink for stocking. Miraculously, a few cutthroat trout are left in the lake, but the population is only a shadow of its former self. McDonald was one of the most productive lakes in northwestern Montana for cutthroat trout, but it will probably never be turned around completely. We can attempt to suppress certain exotic species, such as Mackinaw (lake trout), and encourage the native species. But perhaps the best thing we can do is use Lake McDonald as a good case history to study ecological disturbances, from food competition among aquatic species to space utilization. We can learn a lot from Lake McDonald."

Marnell believes some aquatic research is already at a point where the park can benefit from the data gathered. And, although his studies in the six years he's been with Glacier have been with native fish species, Marnell hopes to see other aquatic resources studied in the future. "The plankton and algae have been almost overlooked," he says. "But the microbiota must be studied since it is the basis of all aquatic life, and it, too, has suffered catastrophic changes with the introduction of exotic fish

species. In fact, these simple forms of life are excellent biological indicators of problems."

Marnell is not sure where the funding for such extensive studies will come from, although the International Biosphere program, of which Glacier is a part, could provide some needed dollars.

As for dealing with today's pressures on Glacier's native fish, Marnell hedges on setting priorities. "It's just not possible to lay out a hierarchy of the problems from the most to the least damaging," he says. "The salvage clear-cutting of beetle-infested forests across the border in Canada is an immediate threat to North Fork spawning grounds. So is the proposal to mine coal in the Cabin Creek area of the North Fork, since the mining residue could affect some of those same spawning waters. But acid rain could turn out to be the most significant long-term problem in maintaining a natural aquatic ecosystem in Glacier. And it's something that could affect not only the fish, but also other kinds of wildlife in Glacier National Park." ■

Commission Honors The Hilger Family

GENE FISCHER

Bryan, Babe, and Dan Hilger

The Montana Fish and Game Commission passed a resolution at its meeting in March honoring Dan, Bryan, and Amelia Hilger, former owners of the Hilger Hereford Ranch near the Gates of the Mountains north of Helena, for their long years of service to wildlife management and to Montana's sportsmen.

The Commission's resolution stipulates:

> WHEREAS, the Hilger family has continuously resided at and been the exceptional stewards of its ranch at Gates of the Mountains since 1867, and
>
> WHEREAS, during that tenure wildlife has continuously prospered and Montana sportsmen have been treated graciously and generously by the Hilgers, and
>
> WHEREAS, the character of the land has retained a special charm and beauty under their stewardship, and
>
> WHEREAS, due to the sensitivity and generosity of the present generation of the Hilger family, Dan, Bryan, and Amelia, the character of this special place shall endure for the enrichment of all Montanans for all time;
>
> NOW, THEREFORE, BE IT RESOLVED, that the Montana Fish and Game Commission, on behalf of this state's wildlife and sportsmen, recognizes the profound contribution made by this exceptional family to our common welfare, and
>
> BE IT FURTHER RESOLVED, that this Commission extends to the Hilgers the heartfelt gratitude of all Montanans for the priceless gifts the Hilger family has bestowed upon our wildlife, the gift of life, and upon our people, the gift of timeless beauty.

The Hilger Ranch, established in 1867 by the Hilgers' grandfather, Nicholas, has been a familiar Missouri River landmark to several generations of Montanans. Various members of the Hilger family conducted boat tours of the scenic Gates of the Mountains area between 1886 and 1942, when the tour operation was sold to the Gates of the Mountains Boat Club.

Last year, Dan, Bryan, and Amelia ("Babe") decided they were growing too old to work the ranch alone; having never married, they had no children to take over the business. So in September they sold the 10,000-acre ranch as well as the approximately 150 head of prize-winning purebred polled Herefords that have become the Hilger Ranch trademark over the past 30 years.

The Hilgers, however, aren't leaving. They reserved the right to continue living at their home near Gates of the Mountains. They also donated a conservation easement to the Montana Land Reliance guaranteeing the ranch will never be subdivided.

Over the years, the Department of Fish, Wildlife and Parks transplanted bighorn sheep, mountain goats, and antelope to the Hilger Ranch and adjacent areas. The Hilgers, who have always had a strong love for wildlife, cooperated enthusiastically in the game restoration projects. According to Jim McLucas, retired department employee who conducted the transplants, the work could not have succeeded without the help of the Hilgers. Today the Hilger Ranch provides habitat for mule and white-tailed deer, antelope, mountain goats, elk, and many species of small game.—*Dave Books*

The Catchall

Department Officials Garner Awards

Rich DeSimone, a biologist for the Department of Fish, Wildlife and Parks in Helena, has received a "Certificate of Recognition" from the U.S. Forest Service, Helena National Forest, for his work with that agency in the Elkhorn Mountains. (The Elkhorns are southeast of Helena.) Under the Intergovernmental Personnel Act (IPA), DeSimone has worked with the FS since 1980 in developing a Wildlife Management Unit in the Elkhorns.

In making the award, Robert S. Gibson, Helena National Forest supervisor, wrote: "Your leadership, expertise, enthusiasm, and hard work have made you a very effective part of our planning team. Your positive influence has gone beyond the Elkhorn project and is more valuable than any of us could have expected when the IPA assignment was conceived. We feel that mainly because of your efforts, a good working relationship between MFWP [Montana Department of Fish, Wildlife and Parks] and the Helena forest has developed and will be expanded throughout Montana."

DeSimone's certificate was signed by FS Chief Max Peterson.

* * * * * *

Spence Hegstad, chairman of the Montana Fish and Game Commission, received an "Outstanding Recognition Award" from the Montana Chapter of the American Fisheries Society. Hegstad was honored at the group's annual banquet in Helena where Gov. Ted Schwinden was the featured speaker.

In presenting the award, Patrick Graham, president of the Montana Chapter, called Hegstad a "positive force in speaking up for and making decisions on behalf of Montana's fish and wildlife resources and the sportsmen who use them." Graham also praised Hegstad's support of implementation of quality oriented wild trout management programs, his efforts toward department purchase of key portions of blue ribbon waters, and his defense of the public's right to use Montana's rivers for recreational opportunity. Graham said, "Spence Hegstad is a sportsman, businessman, commissioner, a person who cares, and one who is unafraid to speak up for the fisheries resource."

Hegstad was appointed to the Commission by former Gov. Thomas Judge. He was recently reappointed to a third term by Gov. Schwinden; he has served on the Commission for nine years, and as chairman for three of those years.

* * * * * *

Ken Walcheck, information officer for the department's Miles City region and a regular contributor to *Montana Outdoors,* has received the Montana Chapter of The Wildlife Society's highest honor: the "Distinguished Service Award." At a February banquet in Butte attended by over 120 private, state, and federal wildlife biologists, Walcheck was given a standing ovation in recognition of his 20 years of outstanding professional service.

In making the presentation, Jon Swenson, a department biologist from Livingston, said: "Tonight we honor a man who has not only excelled as a scientist and educator, but as an articulate and compassionate voice for conservation of our wildlife heritage." Singled out were his efforts toward saving the wild and free Missouri and Yellowstone rivers and his efforts in informing the public about pesticide and sodbusting problems in eastern Montana. Also noted were his efforts to document most of what is known in Montana about the Audubon bighorn sheep, prairie chicken, and the wildlife observations of Lewis and Clark in the state. Swenson said, "This man's voice for wildlife comes from enthusiasm and purpose. His enthusiasm and sense of purpose *have* made a difference for wildlife in Montana. His willingness to accept the consequences for doing so has been inspirational to us all."

He has been *Montana Outdoors'* most prolific contributor, with over 50 articles published since joining the department in 1971. Before becoming an information officer for the department, he was an assistant professor of biology at Northern Montana College in Havre.

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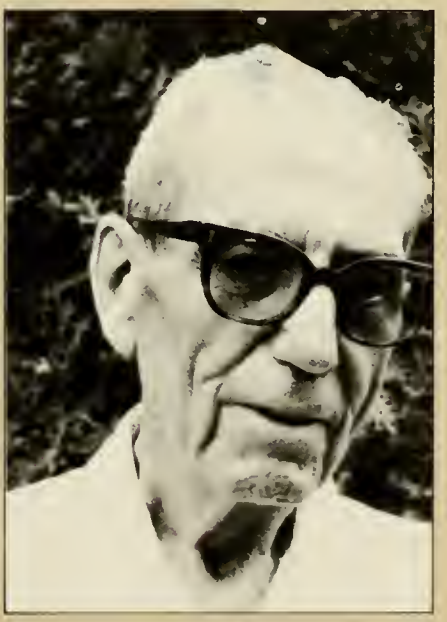
In Memoriam



FRED CARVER

Fred Carver leaves a legacy for sportsmen throughout Montana. He was a staunch supporter of the rights of sports-

men and of the welfare of the fish and wildlife of the state. As a leader in the Billings Rod and Gun Club for more than 20 years, he was the classic example of many of our sportsmen who give unselfishly of their time and money on behalf of our state's wildlife.

Mr. Carver was the kind of sportsman who was always there when the resource needed a friend. He asked challenging and well-thought-out questions of our agency before deciding what his stand would be.

He was named "1983 Sportsman of the Year" by the Montana Wildlife Federation, the highest honor the group can confer on an individual in the state. We, too, feel honored that we were able to work with and know Fred Carver. All of us in resource management and all of the resources that we have the privilege of managing lost a friend Sunday, Jan. 8, 1984. How much he did for all of us, only time will tell.—*Jim Flynn, director, Montana Department of Fish, Wildlife and Parks*

JOHN J. KRIZAN, SR.

John J. Krizan, Sr., the "happy warrior," will be missed. He was a happy man, always smiling and laughing. A lifetime member of the Anaconda Sportsmen's Club, Mr. Krizan died Jan. 15, 1984.

To his allies as well as to his adversaries, Mr. Krizan was also a "serious warrior," campaigning for the cause of western Montana's fish and wildlife resources. He had the benefit of years spent experiencing the wealth of the Big Hole, the excitement of Georgetown Lake and Rock Creek, and the thrill of the Pintlars and the Flints. He gladly gave back to those resources far more than he took. He was always in there fighting "every inch of the way" for the perpetuation and conservation of the resources he cherished so much.

A native Anacondan, Mr. Krizan worked for the Anaconda Co., and was active in a variety of community activities. Working with kids, sports, and the outdoors were his great loves.

His smile remains in the minds of all who knew him, his persistence comes to mind every time the bobber goes under at Georgetown Lake, and his dedication and determination are echoed in the crash of ram horns up on Stucky Ridge.—*Bill Thomas, Region 2 (Missoula) information officer*

Wolfenden Loves "Yellowstone Concerto"

"The Yellowstone Concerto," an award-winning documentary film produced by the Montana Department of Fish, Wildlife and Parks in 1976, was instrumental in promoting public awareness of the Yellowstone River and in ultimately securing water reservations in the name of fish and wildlife that will preserve the mighty river's free-flowing integrity for posterity.

The film has been shown hundreds of times to thousands of people in Montana since its release. But thanks to the efforts of Walter Wolfenden of San Jose, Calif., "The Yellowstone Concerto" has also been seen by thousands of people on the West Coast. Wolfenden, retired since 1965, says he has shown the film at least twice a month since he obtained a print shortly after it was released.

In fact, Wolfenden wore out his first print, and is now working on his second. He laughingly refers to himself as "the best projector lamp buyer in the country." A certified firearms safety instructor, a life member of the National Rifle Assn., and a master counselor for the Boy Scouts of America, Wolfenden has shown the film to friends, Boy Scout groups, church groups, and numerous civic and fraternal organizations. But he says the film receives its biggest exposure during May of each year at the San Jose Sports and Boat Show conducted at the Santa Clara County Fairgrounds. Last year 13,547 people toured his booth and about two-thirds of them saw the movie.

How do people respond to "The Yellowstone Concerto"? "They are awestruck by the beauty of the Yellowstone River and deeply concerned about its future," Wolfenden says. When he tells them that the Yellowstone's free-flowing status has been preserved, he says "they light up like Christmas trees."

Why has Wolfenden carried on an eight-year love affair with "The Yellowstone Concerto"? He says he has fished the Yellowstone in the past and comes to Montana occasionally on vacations. "But mostly," he says, "I wanted to do something to help save this magnificent resource for future generations of Americans."—*Dave Books*

1983

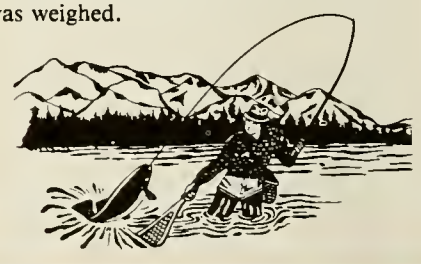
Every year's fishing records have their share of good yarns to go along with the record—this year is no exception. Three records were broken in 1983: bluegill (caught on a worm by 12-year-old Brent Fladmo of Sidney), carp (caught with a bow and arrow by Craig Dyer of Brady), and shovelnose sturgeon (caught by Ray Quigley, Great Falls, by fishing on the bottom with large worms).

Also in 1983, Ray Hatfield thought he had established a new record for golden trout at 2.67 pounds. But a fish caught in 1981, properly verified but not included in the record list, outdistanced Hatfield's golden; it weighed in at 3.14 pounds and was caught by Terry Cameron of Billings.

Gordon L. Stewart of Kalispell thought he had added quite a pumpkinseed to Montana's record list—.24 pounds. That was until Mac Vinnedge, Somers, took a pumpkinseed caught in 1982 out of his freezer that weighed in at .61 pounds, after thawing.

Another newcomer to the list was the stonecat. The fish was caught in September of 1983 by Penn Swedberg, Columbus.

What do you do if you think you've caught a record fish? The Department of Fish, Wildlife and Parks requires that you (1) harvest the fish legally, (2) weigh it on an inspected scale (most grocery store scales are inspected), and (3) have the fish positively identified. *Whenever possible,* that means verification by department personnel. If you can't find a department employee, you must present a photograph from which the fish can be properly identified; with some species, this is difficult. If you didn't have a department employee weigh the fish, you must present documentation from the store where it was weighed.



FISHING RECORDS SUMMARY

Species	Weight lbs.	Weight ozs.	Angler	Year	Location
Arctic grayling	2	10	Mark Daniels	1974	Handkerchief Lake
Bigmouth buffalo	32	6	Gary Lundman	1979	Missouri River (Slippery Ann Game Station)
Black bullhead	1	11	Mike Mitchell	1977	Horse Creek (McCone Co.)
Black crappie	3	2	Al Elser	1973	Tongue River Reservoir
Bluegill *	**2.64**		**Brent Fladmo**	**1983**	**Peterson's Stock Dam**
Brook trout	9	1	John R. Cook	1940	Lower Two Medicine Lake
Brown trout	29	0	E.H. "Peck" Bacon	1966	Wade Lake
Bull trout	25	10	James Hyer	1916	unknown
Burbot (ling)	13	4	Paul Keller, Ernie Schutt	1980	Missouri River (below Fort Peck Dam)
Carp *	**38**	**4**	**Craig Dyer**	**1983**	**Eyraud Lakes**
Channel catfish	23	4	Larry Hamilton	1980	Milk River
Coho salmon	4	14	Irven Stohl	1973	Fort Peck Reservoir
Cutthroat trout	16	0	William D. Sands	1955	Red Eagle Lake
Freshwater drum	13	12	Kelly Monson, Mike Garten	1981	Milk River (near Vandalia Dam)
Golden trout **	**3.14**		**Terry Cameron**	**1981**	**Inlet, Lake At Falls**
Goldeye	2	9	Lester Estenson	1977	Nelson Reservoir
King salmon (chinook)	4	7	Barry Gillis	1972	Missouri River
Kokanee (salmon)	5	15	Forrest Johnson	1976	Pishkun Reservoir
Lake trout	42	0	Dave Larson	1979	Flathead Lake (east shore)
Lake whitefish	5	8	James Sellen	1981	Echo Lake
Largemouth bass	7	8	Bruce Blahnik	1980	Kicking Horse Reservoir
Mountain whitefish	4	9¾	Mike Hangas	1977	Blackfoot River
Northern pike	37	8	Lance Moyler	1972	Tongue River Reservoir
Northern squawfish	6	10	Rick Norris	1979	Flathead Lake (Polson Bridge)
Paddlefish	142	8	Larry Branstetter	1973	Missouri River
Pallid sturgeon	60	0	Gene Sattler	1979	Yellowstone River
Pumpkinseed ***	**0.61**		**Mac Vinnedge**	**1982**	**Rouselle Slough, Flathead River**
Pygmy whitefish	0.16		Orlin Iverson	1982	Ashley Lake
Rainbow trout	20	0	C.J. Brohaugh	1952	Cliff Lake
Rainbow-cutthroat hybrid	30	4	Pat Kelly	1982	Ashley Lake
Sauger	7	2	Raymond V. Johnston	1975	Tongue River Reservoir
Shortnose gar	3	1	John Johnson	1977	Fort Peck Dredge Cuts
Shovelnose sturgeon *	**13**	**1**	**Ray Quigley**	**1983**	**Marias River at Loma**
Smallmouth bass	4	11½	Bob Higson	1975	Horseshoe Lake
Smallmouth buffalo	9	4	Mac McKinney	1977	Hauser Lake (west side)
Stonecat ***	**0.29**		**Penn Swedberg**	**1983**	**Yellowstone River (above bridge at Columbus)**
Walleye	14	0	Neil Berg	1974	Nelson Reservoir
White crappie	2	2	Drew Jackson	1978	Tongue River Reservoir
White sturgeon	96	0	Herb Stout	1968	Kootenai River
White sucker	4	5	Fred Perry	1981	Nelson Reservoir
Yellow perch	2	0	Gerald Pottratz	1974	Nelson Reservoir

*** New Montana record for 1983**

**** New Montana record for 1981**

***** New species added to Montana record list**

For Your Enjoyment

Interpretation is an interesting and enjoyable explanation which broadens understanding and appreciation. Montana's state parks are being interpreted for your enjoyment through a variety of techniques listed below—including living history demonstrations, talks, signs, brochures, and exhibits. (For a complete article on this subject, see "Strike Gold at Montana's State Parks" in the July/August 1983 issue.) For more information, contact regional Department of Fish, Wildlife and Parks offices, or the Helena headquarters.—*Terry Knupp, Region 1 (Kalispell) parks manager*

PARK SYSTEM INTERPRETATION

Name	Sign	Brochure	Trail	Tour	Live Experiences
Bannack SP		general		self-guided town tour	Bannack Days—last weekend in July
Big Pine FAS	largest pine tree				
Blackfoot River		float guide			
Black Sandy SRA	hydroelectric power				
Cemetery Island SRA	cemetery history		hiking		
Chief Joseph SM	battle of the Bear Paw		self-guided		
Chief Plenty Coups SM	Indian history	general		museum	
Council Grove SM	Treaty of 1855				
Fort Owen SM	early Montana history	general		self-guided	
Giant Springs SP	Lewis and Clark Expedition, Giant Springs			group tours available by request	
Greycliff Prairie Dog Town SM	prairie dog life				
Headwaters SP	Lewis and Clark Expedition, fur trade, grist mill technology, frontier settlement	general	self-guided		numerous historic and social events
Intake FAS	paddlefish	paddlefish			
Lewis and Clark Caverns SP	natural history	bats, general	self-guided nature	guided Caverns tour	campfire program
Lost Creek SP			hiking		
Madison Buffalo Jump SM	prehistoric buffalo hunting				
Makoshika SP	badlands geology	general	self-guided nature	auto tour guide	
Medicine Rocks SP	geology, history				
Missouri River		float guide			
Natural Bridge SM	native wildlife, geology		self-guided hiking		
Park Use Regulations		cartoon			
Pictograph Cave SM	pictographs	general	self-guided		
Placid Lake SRA	early logging	general			
Powder River Depot SM	Custer soldier grave				
Recreation Site Guide		location map			
Rosebud Battlefield SM	battle of the Rosebud			annual tour from Custer Battlefield—June	
Smith River		float guide			
Ulm Pishkun SM	buffalo jumps, prairie dogs		self-guided		
West Shore SP	ecology		hiking		
Wild Horse Island SP		general	hiking		
Yellowstone River	geology, fish	float guide			

KEY

FAS = Fishing Access Site
SRA = State Recreation Area
SM = State Monument
SP = State Park

MARTIN ONISHUK

MARTIN ONISHUK

DON'T CUSS THE BRUSH

The next time you lose that pet muddler minnow to an overhanging limb, or you tear those expensive waders thrashing through a patch of willows, don't cuss the &%*&#&* brush—your fishing success depends on it. When you understand how much the neighboring trees, brush, grass, and forbs influence the sizes and numbers of trout in a typical stream, you won't feel so badly about the loss of an occasional fishing lure or leaky waders.

Experienced fishermen work their flies and lures close to fallen trees, brushy banks, and drift piles because that's where the trout seem to be. Scientific studies confirm this notion. Cover—which provides concealment and protection—is the single most important factor in determining how many trout a certain stream will support. Trout will actually fight for cover, the largest and most aggressive ones occupying the choice spots. Bankside vegetation provides much of this cover—fallen trees; willow, alder, and dogwood thickets; grassy banks; washed out roots of standing trees. Research has repeatedly proved that reducing cover along the banks or in the channel will bring a corresponding drop in the trout population. Likewise, providing more cover increases the population.

by William S. Platts and Martin Onishuk

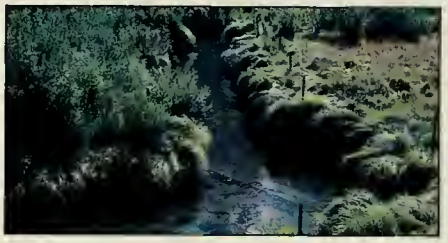
The number of trout in a stream is also influenced by the stability of the stream channel. Here, again, streamside vegetation is at work. With their massive root systems, standing trees are especially effective in protecting the banks against the continual gnawing of flowing water and the seasonal battering of floods, ice jams, and drifting logs. Fallen trees are important, too, sometimes forming pools, sometimes riffles, but generally slowing water velocity to a rate not only favorable to trout but also promoting channel stability. On many streams, were it not for fallen trees, the unimpeded current would soon cut to bedrock. Trout would be deprived of spawning gravel, rearing pools, and rubble that harbors aquatic insects.

Thickets of brush, so aggravating to fishermen, also help anchor the stream bank, and along with grasses are particularly effective for reducing the erosion of upwelling currents. Grass forms a tough sod mat between the brush and trees, thus discouraging surface erosion when the stream floods the bottomland. Forbs—a group of plants that includes thistles, horsetail, dandelion—quickly cover newly exposed soil and minimize erosion until grasses, brush, and trees can take over. Even the leaves and branches that litter the ground serve the trout stream. Such litter traps sediment, which fertilizes the floodplain, and it soaks up and neutralizes toxic substances that might otherwise flow into the stream.

On the typical meandering trout stream, some erosion is natural and poses no threat if it occurs gradually over a long period of time. The outside curves of the stream, where the current is swiftest, erode and collapse. But the eroded soil settles out in the less swift water of the inside curve, where a new bank gradually forms. Grass and brush figure in this process, particularly during high water. The flood forces grass and brush flat against the bank. The matted vegetation slows the current; sediment settles out and builds up along the bank. When the water subsides, plants spring up to protect the new soil from being carried away and to speed the deposition of more. A new, stable stream bank has been formed.

So the gradual cutting and building of stream banks is part of a healthy trout stream. But when too much streamside vegetation is removed, the channel becomes unstable. The current cuts faster than it builds and cuts new channels at will through the unprotected banks. The trout population drops, and the neighboring bottomland suffers severe damage.

Bankside vegetation—including the washed out roots of standing trees—provides choice cover for trout. Knowledgeable fishermen work their flies and lures close to brushy banks and other cover because that's where the trout seem to be (photos: William S. Platts).



Fishermen know that trout are fussy about water quality, particularly about temperature and dissolved oxygen. Streamside vegetation often determines whether these needs will be met. In summer, trout streams are susceptible to extreme heating under the noonday sun. At water temperatures above 68°F, trout usually stop growing; temperatures above 77°F are usually lethal. Raising the average stream temperature just a few degrees can promote an explosion in the nongame fish population and a reduction in the trout population.

Streams can be too cold for trout, too. During long periods of subzero weather, streams rapidly lose heat to the atmosphere on clear winter nights. Ice forms on the bottoms of shallow streams. Such "anchor ice" kills trout eggs by blocking the flow of oxygenated water; heavy anchor ice can cause massive fish kills. Trees and brush along the banks can moderate extremes in water temperature by providing shade during the summer and preventing rapid cooling during the winter. Moreover, the shade itself constitutes a kind of cover that enhances survival of young trout. The effectiveness of the vegetative screen depends on its height, and the width of the stream. Grasses, alone, are effective only on very small streams; brush is adequate on small to medium streams; trees are essential on large streams.

Ideally, the streamside should have an abundance of all four kinds of plants because each makes a unique contribution to the maintenance of cover and channel stability.

In addition to favorable habitat, trout must have a dependable source of food. As indicated by the imitations in the sporting goods stores, insect life is all important. But many streams flow over infertile rock and gravel and thus do not support lots of aquatic insects. On such streams, the trout population depends heavily on terrestrial insects—ants, moths, beetles, grasshoppers—that live in streamside vegetation and that fall into the stream. Also, leaves, branches, and bark that collect on the stream bottom support some forms of aquatic insects upon which trout feed. Thus, removing vegetation along the bank or cleaning organic debris from the channel may drastically reduce the trout population and average size of the trout by cutting the food supply.

To sum up, that often narrow band of brushy woodland that follows the typical stream contributes to the trout population's four critical needs: (1) cover, (2) channel stability, (3) water quality, and (4) food. In addition, this bottomland provides habitat for birds and wildlife, shelter and water for livestock, and scenic beauty. Streamside vegetation deserves protection from excessive grazing and trampling, and also thoughtless dredging, clearing, burning, and careless application of herbicides. Where destroyed or damaged, it should be restored by fencing and planting. Properly managed bottomland vegetation will sustain a productive trout stream at little cost and will protect adjacent property against the ravages of an unstable channel.

The next time your backcast snags high in a streamside fir tree, don't grumble and fume. Without such hazards, you would have fewer trout for which to fish—if you had any at all! ■

APPROACHING THE MOUNTAIN

Granite Peak (photo: GREG NOOSE)

by Greg Noose

At first, Granite Peak was just a name on a map, a black "X" in a field of green, lettered in red: "...highest pt. in Montana, 12,799 ft." I'd heard of it from my partners while climbing in the Cabinets. I was the flatlander, new to the Rockies, and they had taken me in.

I recall listening to them as we rested in a sunny beargrass meadow, high on the summit ridge of Indian Head. They were discussing the mountains of Montana, and someone mentioned the Beartooths. "They've got that Granite Peak down there," said McCann. The mountain remained a mystery to me because nobody said anything more.

My friends in Libby were good to me. They were veteran climbers, but they were always warm and caring; they put up with my inexperience and seemed to enjoy my enthusiasm as I learned from them. As time passed, Granite Peak started to come into focus as a MOUNTAIN. One guidebook described it as "awesome," and I saw it as the King lodged within a circle of mighty castle walls. It was in a place where the summits were high, the elements harsh, and the country unforgiving. I saw a picture of its craggy, snowpacked face in a magazine and it lingered in my memory, thrilling my days and haunting my nights.

It was a quirk of fate that took me to live in Columbus, a quiet Montana town on the banks of the Yellowstone River. The Beartooths took on new meaning as they towered over the country south of my new home, although it was weeks before I could pick Granite out of the hazy blue ridge of mountains showing in the distance. A U.S. Forest Service bulletin described the "elephant-back ridge visible from the highway," yet it was Mount Wood that dominated the horizon as the nearer 12,000-foot peak. But Granite was there, lurking in the background, its face turned slightly sideways and often clouded by storms.

My first forays into the Beartooths came in the autumn, and winter's nearness kept me away from Granite. That fall was full of drama, as the powerful mountain took its toll. "Two Climbers Lost," one report said; an air search found them, miles off course and days overdue. Then a

fall, and a climber hurt, and the near crash of a rescue helicopter on the north face. I came no closer than my view from the road, miles away from the mountain looming ever larger in my mind.

I had months to prepare for my first attempt on Granite and I talked to anybody who knew anything about the peak. "It's a walk, easy but exposed," was what I heard most. My confidence grew and grew. The tough part is not the climb itself but the long approach, nine miles in all. From the trail head, it's five miles and a 4,000-foot gain to a 10,000-foot saddle. Four miles more across the Froze-to-Death Plateau to a group of isolated camping spots at over 12,000 feet. Then a steep descent leads to a spiny, narrow ridge that marks the start up the mountain. Simple. Take a rope, but only for peace of mind.

A week before Charlie, Bill, and I left on our venture, the mountain shuddered again. A novice climber fell 30 feet from a chimney near the summit and broke his hip. He laid on a ledge for 42 hours while Teton rangers battled time and weather to effect a rescue. But I shrugged it off. We knew better.

Our party didn't stand a chance. Granite didn't notice us, and we didn't even see it. We were defeated at the castle gates. We gained the saddle, tired from heavy loads carried in inadequate packs. We lost elevation as we crossed the plateau and took hours to regain it. Demoralized, we searched in vain for base camp sites until a chilling rain finally drove us off. We dropped into Fish Creek where darkness forced us to bivouac on steep, icy, talus cliffs high above Mystic Lake. Fatigue turned to fear as we traded frozen clothes for wet down sleeping bags. Days later, climbers who came to the mountain found the peak shrouded in a thin veil of ice.

We survived though, and a year later I was back, with a partner named Hawkins. Hawkins was a native of the Rockies, and his easy, airy confidence had inspired me that summer as we bouldered along the precipices above the Stillwater River. Months of running in the lowlands paid off on the trails, and our approach was respectable. Our equipment was better too, and many of the previous year's problems were neatly wrapped in Ripstop, Gore-Tex, and Polarguard.

The alpine sun was hot as we trekked across the plateau that day, and our mouths were cottony when Granite finally slipped into view. Step by step, the mountain unveiled itself and our approach revealed to us a world of extremes. Water and ice, sand and stone, chasms and cornices, presented to the music of distantly falling rock that echoed with the wind as it peeled off the great north face. And a bottomless bergschrund, a deep crevice between the rock and glacial ice, slashed across the mountain, making it grimace and frown.

It *was* awesome. And being so near made us nervous and tense. Conversation was short that night as we prepared for the next day's climb, and sleep came hard. The mountain was close and its power was touching us both. Long before dawn, our stove glowed red against the old rock wall that sheltered our tent and kept out the wind. We left before the sun was up, the dwindling darkness seeming to muffle our steps.

It's hard to explain why we never reached the summit. Our progress was slow as we picked our way up the southeastern ridges, yet we had the time we needed. And the storms *were* coming—they always do in the Beartooths. But it was our palms that were wet, not the rocks. We were high on the mountain, overlooking the north face, when we turned around to go back. We made the decision together, and once we did, we wanted only to get home. It was months before we decided to go back and try the mountain again.

Our return to Granite came the following fall, and Bert was with us on this trip. His enthusiasm added strength. Our approach was swift and sure, and our gear was flawless. This time the storms were real. Hurricane winds battered our tent through the night. The rain came in deafening sheets and gave us little rest. There was no dawn that day and no chance to climb Granite. But we passed the night in comfort, dry and warm, in lofty bags laid on pads that cushioned the floor of our tent. After a warm breakfast, we hiked in the wind to the top of Tempest Mountain for a look at Granite before we had to start back. And the trip was worthwhile.

Images of Granite stay with me. My relationship with this mountain has given me a goal, and I am filled with the satisfaction of many small and personal triumphs. Triumphs over physical and emotional barriers within myself and the triumphs of learning to adapt to the environment around me. And the triumph of friendships forged in intensity on the side of a mountain. I may even reach the summit someday. I hope so. I'd like to feel that part of Granite Peak. But if I do, it will be on Granite's terms, not mine. A mastery only of myself and never a mastery of the mountain. The mountain will always be King.

Others will find no thrill on Granite Peak, no challenge. Their strengths will be different and tested elsewhere. Not greater or lesser, only different and uniquely their own.

And still others will come lightly to Granite. Frivolous travelers in an alien land. And they'll climb the peak but miss the mountain. And Granite will let them. Or maybe it won't. All rights are reserved.

In fall of 1982, an early winter storm decimated a party of climbers camped on Granite's lower western approaches. They fled in haste in the face of furious snows. Without snowshoes, their struggle was savage and their escape narrow. They were disoriented and hypothermic when they finally found shelter with the caretakers who live far below Mystic Lake.

That same autumn, a young backpacker slipped from a rock on the cliffs of Phantom Falls underneath Froze-to-Death. His leg was broken and he could go no farther. Bill and Hawkins and I were part of the rescue party, and we stayed with him through a long night in the rain, preparing for his evacuation. Through his pain, he wondered what he'd done wrong, where he'd made his mistake. But he'd made no mistake. His ordeal was more than an accident. It was the power of the mountain.

* * * * *

• *On Aug. 17, 1983—on his fourth try—author Noose scaled the mighty castle walls and attained the King: Granite Peak.*—Ed. ■

Readers Respond

Absaroka-Beartooth Fan

I may be a victim of what might be called "geographic bias." I and some of my kin have been receiving *Montana Outdoors* for over three years. I've noticed that almost all of your articles have their roots in western or northwestern Montana. Every once in a while, you throw in a story on Fort Peck fish or wildlife, or sometimes something on the Yellowstone River country.

I am from southwestern-central Montana, spending my life in or around the Absaroka and Beartooth Mountains. If you're from west of the divide and haven't heard of the Absaroka-Beartooth Wilderness, you're not alone. Many people haven't. Some say, "Good, let's keep it that way," but I think this is one area of Montana containing riches found nowhere else in the lower 48.

The Absaroka-Beartooth Wilderness is the second largest wilderness area in the state. Comprising something like 20,000 acres less than the Bob Marshall Wilderness, it contains over 900,000 acres of pristine alpine land. When people see some of the pictures from this area, they often ask, "Where did you take that? In Glacier?"

I suppose I should tell you that I'm trying to encourage you to publish an article on the "Glacier Park" on the south side of the state. To entice you, I'll tell you what I've observed and learned about this area.

Three-fourths of the Beartooth portion of the wilderness is above timberline. It might be called "the top of Montana." It's the highest block fault in the state, containing over 25 peaks above 12,000 feet, the highest of which is Montana's highest point—Granite Peak, nearly 13,000 feet (at 12,800 feet—or should I say 12,799 feet, but let's not get technical).

According to geologists, the entire Beartooth plateau was covered by a huge ice cap until about 8,000 years ago. From this ice cap flowed huge glaciers, several thousand feet thick, forming such glacial valleys as the Rosebud, Rock Creek, upper Clark's Fork of the Yellowstone, and the Stillwater. Most geologists refer to the Rock Creek Valley above Red Lodge as one of the most well preserved—a classic example of a glacial valley.

Today, only remnants of the giant glaciers and the ice cap are left, as countless snowfields and over 40 glaciers. The longest of the glaciers is Grasshopper Glacier (east), about two miles long and about one-third of a mile wide. The most famous glacier is Grasshopper Glacier (west), about a mile in diameter. The bodies of myriad grasshoppers (or locusts) are preserved in its ice. The insects were supposedly blown down upon the ice by a snowstorm, the latest dated about 200 or more years ago. Also, huge glacial boulders still clog the streams and rivers and dot the plateaus.

There are more than 10 such plateaus, some several square miles in area, varying from just below 10,000 feet to nearly 12,000 feet, some of which contain permafrost. In some places, the ground rarely thaws to more than a foot below the surface. Geologists tell me that the Beartooths contain the largest expanse of sub-Arctic alpine tundra in the lower 48 states. In fact, a person can walk great distances on fairly level ground. Anywhere else in Montana, he would have to be in an airplane to walk this high.

Kettle lakes and boggy areas dot some plateaus, and the whole area contains plant life similar to that found in the Arctic, all far above timberline. Some of the lakes support grayling and the beautiful golden trout. Some places contain strange formations known as "rock polygons" (also found in the Arctic), and there are rocks piled in circles and lines due to frost action. The ice cap prevented glacial erosion of these plateaus. The Beartooth Highway travels across one of those plateaus, rising to a summit of 10,940 feet (higher than the highest mountain in Glacier National Park). Rocks along this highway are some of the oldest in the world (3.5 billion years old). Part of the highway crosses into Wyoming, but it is never more than five miles from the Montana border.

Precipitation in the Beartooths is between 80 and 110 inches a year, surpassed only by the area in and around Glacier Park. Snowfall of some 200 inches in the winter is common. This is about 16 feet on the level. It can snow any day of the year, but most of the snow melts by the first part of August, and most storms are rain until after Labor Day.

Mountain goats and sheep come to these high plateaus in the short summer months to graze on the small willows, grasses, lichens, and mosses. The valleys, meadows, and pine, fir, and aspen groves abound with grouse, ptarmigan, deer, elk, moose, bear—you name it.

I suppose I could ramble on about the wildflowers splashing their colors against snowbanks, alpine meadows, the pink snow, the countless waterfalls—but this is supposed to be a letter, not a book.

It is time to say a little about the Absaroka portion. Absaroka means "sparrow hawk." Only one-fourth of this portion of the wilderness is above timberline. The northern part of the Absaroka can be seen from Paradise Valley, southwest of Livingston. It is composed of rolling timbered mountains, and dotted with meadows, lakes, and streams. It's a beautiful country, big, relatively untouched in places. Some 8,000 years ago, the Indians crossed the glaciers in the valleys to camp on the protruding mountain meadows.

A wildlife biologist once told me that a 100-square-mile area in the Absaroka-Beartooth (including the Cooke City area) contains the largest concentration of black bears in the United States. I wouldn't doubt that it also has one of the state's largest moose concentrations. The Absaroka-Beartooth Wilderness is home for the few grizzlies in the Yellowstone ecosystem that mark their territories outside the park.

Perhaps not *quite* as beautiful to look at as Glacier Park—although beauty *is* in the eye of the beholder—this wilderness is often left out and overlooked. I would call it the "Second Glacier National Park." Although this wild, harsh wilderness is not a park, it is part of Montana, which makes me very proud.—*Ted W. Israel; Joliet, Mont.*

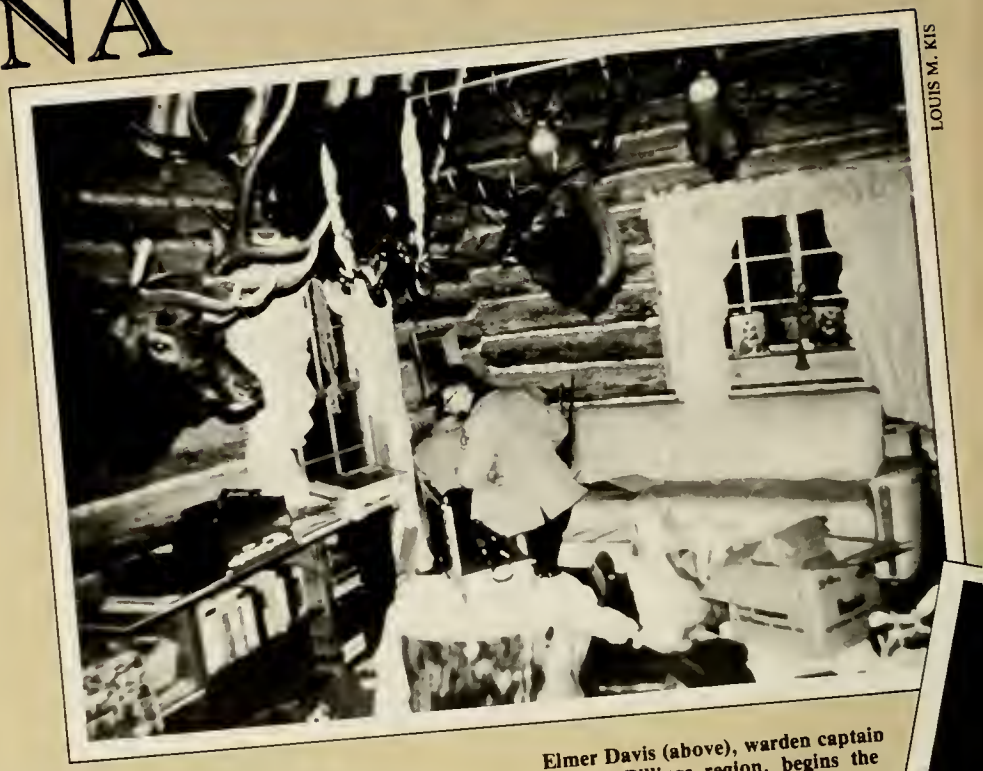
The Moth Is A Butterfly

The beautiful picture on the back cover of the Jan./Feb. 1984 *Montana Outdoors* is of a butterfly, not a moth. More specifically, it appears to be a member of the subfamily Plebeiinae, commonly known as the "Blues." Blues are small, bluish-colored butterflies (females are often brownish) found throughout North America. Different species can be hard to tell apart. They often like to congregate by the hundreds at puddles of rain water.

Most butterflies can be distinguished from moths by their club-shaped antennae. Moths usually have feathery or threadlike antennae. Congratulations to Steve Wirt for a beautiful picture.—*Kristi DuBois; Choteau, Mont.*

MONTANA STING

by Bill McKiernan



LOUIS M. KIS

Elmer Davis (above), warden captain for the Billings region, begins the long process of cataloging the evidence found at Jerry Marjerrison's house in Plains. All of the animal parts found in the room were confiscated to be used as evidence.

The young woman tending the desk at the motel on the outskirts of Thompson Falls seemed quite surprised that business had been so brisk. Usually during February, business was pretty slow. But not today; all day, groups of two or three had come in and registered. She asked the arrivals why they were traveling in such weather, but only drew answers such as fishing, business, or just passing through. She had no idea this group of men actually knew one another. Even though they all ate dinner in the restaurant connected to the motel, little sign of recognition passed between them.

Her curiosity would really have been aroused if she could have seen all her tenants meeting in one of the rooms the next morning at 4:30, now dressed in their full uniforms as wildlife officers. The quiet and disciplined gathering on that snowy morning was the culmination of an investigation that had lasted over a year and a half and had spanned at least six states. The investigation which originated in Montana would eventually break up one of the largest wildlife poaching rings on record.

The investigation actually started in 1981 when Chet Lamoreux, a warden in Thompson Falls (a small town in western Montana), noticed that a couple of nonresidents were spending a lot of time with Jerry Marjerrison of Plains (another small town in western Montana, near Thompson Falls). Lamoreux had encountered one of the nonresidents before, a Denver police detective, when he had arrested Marjerrison for a game law violation that resulted in Marjerrison losing his outfitting license and his hunting and fishing privileges. Some checking revealed the second nonresident was a well-to-do rancher from Texas (since some charges are still pending against the Texan, he cannot be named in this article). Since no hunting seasons were open, Lamoreux wondered what the two men were doing in Montana. His curiosity was spurred when he heard rumors that although Marjerrison's outfitting license had been revoked, he was still actively engaged in guiding.

Lamoreux discussed his observations and suspicions with his supervisor, Warden Captain Louis M. Kis, Kalispell, and they decided to contact the U.S. Fish and Wildlife Service (USFWS) to see what federal files might show. These records revealed some interesting facts.

Marjerrison had been marked in a federal investigation in Nevada for selling wildlife parts to a Reno taxidermist. The Texan had hunted all over the world with prominent people and was a frequent companion of the Denver police detective, Dale Leonard, a veteran of 18 years on the Denver police force. Federal agents had information that Leonard was guiding wealthy hunters from all over the world on illegal hunts in Colorado, Texas, and Montana. Officers also suspected that Marjerrison, Leonard, and the Texan were killing trophy animals and selling parts to other hunters.

Lamoreux continued to pass along information about the activities around Plains, and the federal agents and fish and game authorities in Montana, Colorado, and Texas became even more interested. Later, a scene unfolded in Colorado that would reveal why Lamoreux had repeatedly seen the nonresidents with Marjerrison in Plains.

The Colorado Division of Wildlife received a phone call from an informant about illegal guiding activities of Steven McClung. McClung, who purportedly owned a wildlife art studio in Colorado Springs, had offered the informant a closed season trophy deer hunt in Colorado for $2,000. An elk hunt in Montana was also mentioned. These hunts were guaranteed to produce a trophy that would make the record book. Also offered was a bighorn sheep hunt in Montana that would guarantee a sheep with at least a 40-inch curl. The elk and sheep

hunts were priced at $10,000 each. Because of possible federal violations along with the state violations, the Colorado department contacted the USFWS. The informant was reluctant to participate in the hunt, so an undercover agent from the USFWS took his place and arranged with McClung for a trophy deer hunt in Colorado.

Illegal Deer Hunt in Colorado

When the USFWS undercover agent contacted McClung about the upcoming closed-season deer hunt, he was informed that McClung and his partner—Dale Leonard—had been scouting deer areas for two weeks. He was told the two already had trophy bucks located, that the risk of being caught was practically nonexistent, and they would be hunting by snowmobile. Cost of the hunt would be $2,500, and the kill would be guaranteed. Payment had to be in cash, and McClung would supply the firearm. He also claimed to know an excellent taxidermist who would mount the head, with no questions asked.

The hunt took place early in 1982 and ended with Leonard killing a large mule deer buck after the USFWS agent deliberately missed it. Leonard caped the deer, and the meat was left as waste in the field. The cape and antlers were dropped off for mounting at Kevin Fruit's taxidermist shop in Denver.

During the hunt, Leonard mentioned a friend from Montana, by the name of Jerry, who was hunting mountain lions in Colorado. Leonard noted he was going to hunt elk with this Jerry—near Plains, Mont.—in February and that the agent could go along if he wanted to.

Elk and Sheep Hunt in Montana

USFWS personnel maintained contact with McClung and Leonard and continued to gather and file information. In March, a trophy sheep and elk hunt was planned in Montana through McClung and Leonard. It was to be guided by Marjerrison and would take place fairly close to Plains. During planning for the sheep and elk hunt, much valuable information surfaced, including the names of others connected with the poaching ring. Illegal guiding activities in British Columbia were discussed, and the names of at least two taxidermists who mounted illegally taken big game were revealed. The name of Lucian Ball of Billings was also mentioned, along with the fact he was illegally hunting elk on the Crow Indian Reservation (Ball was later convicted).

Two undercover agents flew to Missoula in late March and were picked up by Leonard and Marjerrison and driven to Plains. The agents were posing as hunters from Pennsylvania who wanted to bag a trophy bighorn sheep. The hunt resulted in Leonard killing a large ram after one of the agents had missed. When they returned to Plains, Marjerrison encouraged the undercover agents to book a hunt for bear and "whatever else they might see" for June. The agents tentatively agreed, and paid Marjerrison $7,800.

Throughout the summer, Lamoreux continued to gather information that would be critical in bringing the cases to a successful conclusion. Because the investigations were secret (to protect the agents), Lamoreux had to be very careful that his actions didn't tip off the poachers.

The agents finally arranged a deer and bear hunt with Marjerrison for September of 1982. Fruit, the taxidermist from Denver, and Leonard, planned to participate. When agents arrived at Marjerrison's house on Sept. 20, they found Fruit skinning a small bear killed the day before. Fruit informed them he had also killed a five-point white-tailed buck.

During the three days the agents hunted with Leonard, Fruit, and Marjerrison, they were told of many illegal hunts around Plains and also in other states. Marjerrison bragged about his $300 fine and loss of hunting and fishing privileges. The way he figured, he said, the Montana Fish and Game owed him a "buck" for

LOUIS M. KIS

Each of 196 pieces of evidence found at Marjerrison's house had to be photographed and tagged with two different tags. Bill McKiernan (left), assistant administrator of the department's Law Enforcement Division and operations leader for the "take down," is attaching an evidence tag to an antler. Jeff Scott (below), warden from Billings, loads some of the heads confiscated from Marjerrison's house into a truck.

LOUIS M. KIS

every buck he had been fined; he had killed 12 in the last two years, so he still had 288 coming. During the hunt, Marjerrison shot at and missed a large bull elk; an attempt at killing a bull moose failed, but two large buck deer were killed. All of the kills came after dark, with the aid of a spotlight. A bear was also killed, but during daylight. Fruit and Leonard agreed to haul the trophies back to Denver where Fruit would mount them. The agents paid Marjerrison for the hunt and left.

Preparations for the "Take Down"

Shortly after, officials from the Montana Department of Fish, Wildlife and Parks and USFWS personnel met in Helena. They decided enough evidence had been gathered, and started to plan the "take down." They discussed the case with prosecuting attorneys and dealt with grand jury appearances, search warrants, and manpower needs. Another meeting was conducted in early January of 1983 to make final plans. Two "raid" teams were needed for the Montana part of the operation. Ten wardens were selected and gathered in Helena for special training; three federal officers were also recruited.

On Feb. 6, with care exercised to maintain secrecy, all participants in the "raid" teams gathered in DFWP Director Jim Flynn's office in Helena. Each team was briefed, and specific assignments were reviewed. The team went over every possible detail of the situation, including the floor plans of Marjerrison's house in Plains. Sanders County Attorney Claude Burlingame outlined legal aspects of the case for the team. The second team would go to Sidney, where McClung was apparently trying to lease some land for trophy whitetail hunts.

Early Morning Raids

The early morning gathering in the Thompson Falls motel room was the start of the final chapter in an investigation that produced reams of investigative reports and legal documents. Five vehicles loaded with officers left the Thompson Falls motel for Marjerrison's Plains residence. Nobody knew for sure what to expect when they arrived. Warden Lamoreux led the procession, which drew curious stares from the locals they met on the highway.

The Montana warrants (along with those being served in Colorado) were executed at exactly 6 a.m. When the uniformed officers arrived at his house, Marjerrison was in bed. It became clear the "uniforms" meant business, and everything went smoothly. He was kept under guard in the living room of the house all day, while officers tagged and photographed 196 pieces of evidence found in the house.

The Sidney team did not find the McClungs at home. They had gone to Canada to try to sell some whitetail antlers McClung had purchased in Sidney; however, officers seized their huge collection of trophy heads. Shortly after, they were also taken into custody.

In Colorado, Leonard was arrested and taken in to be booked; he was suspended from the Denver Police Department. Fruit was arrested and booked, and numerous heads, mounts, and capes were taken as evidence.

LOUIS M. KIS

Most of the illegally killed animals taken from Marjerrison's house had been mounted by Denver taxidermist Kevin Fruit, who was charged in the case. Also found were photographs of many of the animals killed during the illegal hunts.

In addition to the 196 pieces of evidence found in Marjerrison's house, officers also found records that led to interviews of 26 persons outside of Montana. At this writing, many of these individuals have cases pending against them. Photos seized in both Montana and Colorado showed the slaughter of hundreds of animals—all for a price. These photos provided valuable evidence and additional leads.

As this magazine goes to press, 10 persons have been indicted under federal charges of violating the Lacey Act. Conviction carries a penalty of five years in prison and/or a $20,000 fine. The investigation is continuing, and more charges are expected to be made.

In the Montana operation, Marjerrison, Leonard, McClung, and Fruit have been fined and have received prison sentences through federal court; for her involvement, Cindy McClung received a fine and a suspended sentence.

Trophy Heads Equal Big Money

Many people have difficulty comprehending why trophy heads are worth so much money. Why will someone pay a huge price for an illegally taken wildlife head, at times one not even killed by the "owner." Why will some people pay a great deal of money to join an illegal hunt, taking a chance of getting caught and possibly even serving a prison term, in order to see their names in a record book and a mounted head hanging in the den. Call it ego, a disease, greed—call it what you will, but large trophy heads and mounts are worth a small fortune. Nobody knows for sure how many dollars change hands each year in the selling and buying of illegal wildlife parts. It seems that some of the more unscrupulous will go to any end to see their names in a record book.

With the high prices that animal parts bring on the illegal market, state wildlife agencies faced with tight budgets and lack of manpower are looking for ways to help solve the indiscriminate taking of wildlife. Many states have begun programs where concerned citizens take an active part in protecting and preserving these animals.

For example, many states offer a toll-free hotline where citizens aware of a wildlife violation can call in and pass along their information to state enforcement officials. They can remain anonymous if they wish, and may be eligible for a reward if their information leads to arrest. In many states, such programs have been very successful. Just knowing that an acquaintance could turn them in has caused some poachers to curtail their operations. They have also had problems trying to sell their illegal wares to people who now have a more cautious attitude. A program including the reward system was presented to the last Montana Legislature, but the measure failed to pass. (Montana maintains a toll-free hotline—1/800-332-6117—but no reward system.)

More and more state wildlife agencies are developing programs that take selected officers out of uniform and place them undercover. Initiating such programs requires special training, technical equipment, and additional manpower. However, such programs have been successful in combating criminal operations involving wildlife.

Wildlife agencies are increasing efforts to try to improve the investigation techniques of their officers and their ability to substantiate evidence in court. Identifying blood and hair samples, being able to accurately determine time of death, and identifying sex through skeletal composition are skills that help wildlife officers bring cases to successful conclusions.

The fact remains: Game wardens can't do the job by themselves. They need the eyes and ears of concerned citizens. ■

Hooking Onto Special Regs

by Steve L. McMullin

upper Madison (photo: JERRY MANLEY)

Standing knee deep in the rushing water of the Big Hole River, Tim Mosolf strains to hold a 12-foot Boston whaler in place. Fisheries biologist Dick Oswald and field man Dave Sommer are in the boat. Over the roar of the portable generator, Tim yells, "Ready?" Dick nods and Dave flings a five-foot-long electrode out to the end of its 25-foot cord. As the electrode hits the water in the riffle at the head of a long, deep pool, the water boils with fish. Dick picks up two brown trout, each about 16 inches, before he hears Tim scream, "Get the big one!" Rolling in the swift current is the biggest trout any of them had ever seen. After several heart-stopping misses, Dick nets the monster and puts her in the "live car" on board the boat. She weighs 19½ pounds.

Dick and his crew electrofish that stretch of the Big Hole between Divide and Melrose at least 15 times per year. The electrofishing is done to estimate the trout population. While

they rarely see fish that even approach the size of the "Big Hole Monster," each year they see more and more large trout. (The giant brown described was initially captured in March 1982. She was recaptured in September 1983, when she weighed 20.1 pounds.)

The reason for the increase in large trout is the fishing regulations put into effect in spring 1981. The special regulations were specifically designed to increase the number of large trout. In the Big Hole River, and in some other waters, special regulations can result in dramatic increases in numbers of large trout. Not every stream, however, is suited to special regulations.

Most of Montana's trout streams have a limit of five fish, often with a restriction of only one fish over a given length. The length varies in different drainages. While there are exceptions that liberalize the limit (to allow a greater harvest of brook trout, for example), most often the exceptions to the general limit are more restrictive or "special regulations." There are many kinds of special regulations, each designed to accomplish a different objective. Although the specifics vary considerably, Montana's special regulations generally fall into four categories: reduced limits, catch and release, slot limits, and species specific regulations.

The question of whether or not to apply special regulations to a stream and, if so, which kind of regulation is strongly influenced by the public. The Department of Fish, Wildlife and Parks has frequently asked anglers: "What do you want?" The answer almost invariably is: "We would rather catch fewer large trout than many small ones." When fishing pressure is high, that often means special regulations are necessary. It is important, however, to limit the streams under special regulations: If all streams have special regulations, they are not so special. And the segment of the fishing public that objects to special regulations must also be served. During the 1984 fishing season, Montana will have special regulation on approximately 2% of its more than 12,000 miles of trout streams.

The regulation instituted on the Big Hole River in 1981 was a slot limit. It allows anglers fishing between Divide and Melrose to keep three fish under 13 inches and one over 22 inches. All trout between 13 and 22 inches must be released. A slot limit regulation is designed to increase the number of larger fish by eliminating the harvest of those fish in the "slot." It allows an angler to keep a few smaller fish for the frying pan as well as one trophy fish—if he is lucky enough to hook one.

STEVE L. McMULLIN

Department fisheries biologist Dick Oswald holds the "Big Hole Monster"—19½ pounds of brown trout. Department biologists can't claim credit for the "Monster's" existence, but as special trout management regulations remain in effect, anglers should see more and more trophy-sized trout in that stretch of the Big Hole.

Since the slot regulation mandates that many fish must be released by the angler, it is imperative that gear restrictions be instituted simultaneously. Many studies from around the country have shown that trout caught on a baited hook suffer significantly higher mortality (30% or more) after release than those caught on artificial lures. The reason for the difference: Baited hooks are more often swallowed by the fish, causing injuries to gills and internal organs. While these death-causing injuries sometimes happen with flies and lures, the mortality due to hooking is usually 5% or less. Surprisingly, studies have shown no significant difference in mortality of fish caught and released on lures versus flies, treble hooks versus single hooks, or barbed versus barbless hooks.

In addition to the Big Hole River, Montana currently has a slot limit regulation on two portions of the Bitterroot River near Darby and Stevensville, and on a stretch of the upper Clark Fork River near Deer Lodge. A slot limit identical to the Big Hole was put into effect on a section of the Gallatin at the same time, but has been removed. A comparison of three fishing seasons under the same slot limit in the two rivers yields some interesting results.

In March 1981, before initiation of the slot limit, an estimated 506 brown trout per mile, 13 inches and longer, were found in a department electrofishing survey of the Maiden Rock section of the Big Hole. Two years later, 13-inch and longer browns had increased by 33% to 674 per mile. The increase in 18-inch and longer browns during the same period was an astonishing 160%, from 40 per mile to 104. The response of rainbow trout has been even better. Thirteen-inch and longer rainbows increased by 79% between fall 1981 and fall 1983, from 251 to 451 per mile. Fifteen-inch and larger rainbows jumped from 89 to 247 per mile, an incredible 178% in two years.

Clearly, the slot limit regulation is doing what it was intended to do in the Big Hole River. But a much different picture emerged in the Gallatin River. Thirteen-inch and longer rainbow trout in the department's Durnam Bridge section of the Gallatin actually decreased slightly between 1981 and 1983. Obviously, there are some differences between the trout populations in the Big Hole and Gallatin rivers.

DFWP biologist Dick Vincent cites angler harvest as the most important factor in determining success of a restrictive regulation. It makes sense. If anglers are not harvesting enough fish to limit the population, then the population will not grow when the harvest is restricted. It appears that is exactly why the slot limit regulation worked so well on the Big Hole, but not on the Gallatin. Restricting harvest on the heavily fished Big Hole resulted in immediate increases in the trout population. With less fishing pressure on the Gallatin, some other factor held the population in check. Vincent's studies showed overall mortality remained the same on the Gallatin, even though mortality from angling was reduced. When it became obvious the slot limit was not work-

ing, DFWP biologists recommended its removal. The Montana Fish and Game Commission approved the change on the Gallatin back to general regulations, effective in May 1984.

It is still too early to tell if the slot limit regulations on the Bitterroot and Clark Fork rivers will result in increased numbers of large trout. DFWP biologists will monitor fish populations in these newly established special regulation sections to see if they achieve intended goals. If the goals are not met, the regulations will be removed.

Catch and release is one of the most popular forms of special regulations. Fishing for sport only has become a way of life to many fishermen; when a body of water receives extremely heavy fishing pressure, catch and release is the only regulation that will allow the trout population to remain high. Catch and release fishing is not designed specifically to produce more big fish—it is designed to maintain higher numbers of fish, period. It is a happy circumstance that often, more *large* fish are also produced.

Two of Montana's most famous trout streams, the Madison River and Rock Creek, now have sections of catch and release fishing. No story about special regulations would be complete without a discussion of the Madison.

The Madison River is a classic case of a stream that *needs* special regulations. It is the most intensely fished stream in Montana. Under the 10-fish limit in effect through the 1977 season, only one of four fish in the river in spring survived until fall. Angler harvest was responsible for most of the mortality.

Realizing the role that angler harvest was playing with Madison River trout populations, the department established a test section closed to all fishing, beginning with the 1977 season. One year later, a catch and release section was established adjacent to the closed section. Results were no less striking than those on the Big Hole. What surprises many people is that increases in the catch and release section were nearly as large as those in the closed section. Between

JERRY MANLEY

On carefully selected Montana waters, special regulations can result in dramatic increases in numbers of large trout. During the 1984 fishing season, Montana will have special regulation on approximately 2% of its more than 12,000 miles of trout streams.

1976 and 1982, the number of 13-inch and larger rainbow and brown trout combined increased by 467% in the closed section. Between 1977 and 1982 in the catch and release section, the number of 13-inch and larger trout increased 315%.

Although the population increases in both sections were phenomenal, the slight difference can probably be attributed to the river itself. The Madison is essentially one long riffle that affords few resting places for trout. Trout played to exhaustion by anglers often die when they have no quiet spot in which to recover their strength. Consequently, mortality was always slightly higher in the catch and release section than in the closed section. However, it was substantially lower than in the days of unrestricted fishing.

Armed with this evidence, DFWP biologists recommended opening the closed section to catch and release fishing in 1983. After one season, the population of 13-inch and larger trout declined slightly, but still remained 361% higher than in 1976.

Not all of the special regulations success stories have come from east of the divide. Special regulations have helped to improve the trout fishery in Rock Creek near Missoula. In response to angler dissatisfaction with declining numbers of larger trout, the department initiated two types of special regulations on Rock Creek in 1979. A catch and release section was established between Butte Cabin and Hogback creeks. The remainder of Rock Creek between the West Fork and the mouth was put under a reduced limit of three fish, only one of which could exceed 14 inches (the old limit was 10 fish).

Fish populations in the lower Rock Creek area (the three fish, one over 14 inches limit) have responded predictably. Rainbow trout have increased dramatically, by over 270%, since the regulations were changed. The number of brown trout has remained virtually unchanged. It is an established fact that browns are not as easy to catch as rainbows; lack of an increase in brown trout numbers suggests anglers were not significantly affecting brown trout populations.

In spite of the large increase in rainbow trout numbers in lower Rock Creek, there has not been an increase in the number of 14-inch and larger fish. Although the limit on these larger trout is only one fish, DFWP biologist Don Peters believes: "It would appear that fisherman harvest of one trout over 14 inches in lower Rock Creek is still significantly reducing numbers of trout in that size class."

Trout populations in the catch and release section of Rock Creek have changed dramatically. The changes have not been exactly what DFWP biologists anticipated, however. The population of cutthroat trout in the catch and release section has increased over 700% since the regulations were initiated. Rainbow trout have not increased at all, suggesting that at least some of the increase in cutthroats came at the expense of rainbows.

While unexpected, the different responses of rainbow and cutthroat trout to catch and release in Rock Creek is the basis for an innovation in special regulations. The new wave is "species specific regulations"—"species regs" for short.

Species regs are designed to increase fishing opportunities by recognizing differences in the abundance and ecology of various species. While Montana fishing regulations have generally lumped most salmonid species together, species regs—in the form of different limits for brook trout, whitefish, and kokanee salmon—have been around for a long

time. So far, Montana's species regs have been designed to take advantage of overly abundant fish. Beginning with the 1983 fishing season, a new kind of species regulation went into effect on the Madison River between McAtee Bridge and Ennis Lake. While the general limit remained the same—five trout with only one over 18 inches—a new restriction was added: Only one rainbow trout and only one grayling could be included in the limit.

The new regulation was designed to protect limited populations of rainbow trout and grayling, while allowing anglers to harvest fish from an abundant brown trout population. It is still too early to judge the regulation's effectiveness, but early signs are encouraging. The number of 13-inch and larger rainbow trout in fall 1983 was the largest since 1976.

In 1984, the same regulation will be applied to rainbows in the Bighorn River. A species regulation designed to protect cutthroat trout in the Yellowstone River between Yellowstone National Park and Emigrant will also go into effect in 1984.

If these species regs succeed, it will be largely due to the anglers themselves—it will be important for them to identify what kind of trout they have caught. Placing the burden of identification on anglers is a new concept, but one whose time has come. Other sportsmen are expected to be able to distinguish a sharp-tailed grouse from a pheasant, a mule deer from a white-tailed deer, and one species of duck from another before they shoot. It is not unreasonable to expect an angler to distinguish a cutthroat from a brown trout when he has the fish in hand.

The obvious reason for species regs is a difference in abundance in a mixed species population. The underlying reason is usually a difference in catchability. Brown trout are notorious as the most difficult to catch of the trout species. Rainbows are usually somewhat easier to catch, and brook trout easier still. Of all the trout species, however, the cutthroat is without doubt the easiest for an angler to fool.

The westslope cutthroat trout is the spruce grouse (fool hen) of the trout world. Native to all of Montana west of the Continental Divide and the Missouri River Basin upstream from Great Falls, the cutthroat is now found only in remnant populations east of the divide, and its range is much reduced in the west. The upper Flathead drainage is the westslope's last stronghold in Montana. Much of the decline can be blamed on introductions of other species. Westslopes don't compete well, and they readily hybridize with rainbows. But part of the blame can be attributed to fishing pressure—fishing pressure that wouldn't dent a population of rainbow trout can sometimes decimate a cutthroat population.

How foolish is the cutthroat? A few years ago, I asked my assistants to take their fishing rods along while they were doing some other research on the Flathead River near Kalispell. In their spare time, they caught fish, tagged them, and returned them to the water. One of the fish they caught was a nice 17-inch male westslope cutthroat. After tagging and releasing the fish, they continued casting. Ten minutes later, they caught the same fish on the same lure. A fish with that sort of intelligence can be easily hurt by fishing pressure.

It is no surprise that some of the earliest experiments with special regulations in the Pacific Northwest were designed to protect the westslope from overharvest. Two different regulations have been in effect in northern Idaho since the early 1970s, and both have been successful in increasing cutthroat numbers.

The St. Joe River, east of Coeur d'Alene, Idaho, is a very popular trout stream with anglers from Coeur d'Alene and Spokane. Because of heavy fishing pressure, trout fishing in the St. Joe declined throughout the 1960s. In 1971, a limit of three fish, all of which had to be longer than 13 inches, was put into effect. Within four years, the cutthroat population increased by 300%. The population has remained high—in 1982, cutthroat were more abundant than at any time during the study. The number of 13-inch and larger cutthroat has not increased much because anglers have continued to harvest most of the larger fish.

Results of special regulations in Kelly Creek, a tributary of the North Fork Clearwater River near Lewiston, Idaho, have been even more spectacular. Catch and release was initiated in 1970 in the entire Kelly Creek drainage. In 1975, Idaho biologists counted 13 times as many cutthroat as in 1970. In the uppermost part of the drainage, a roadless area, trout are three times more abundant than in the lower drainage. Idaho sportsmen and the Idaho Department of Fish and Game are currently fighting plans to log a portion of the roadless area. They fear that new roads and timber harvest may result in deteriorating trout habitat in Kelly Creek and a reversal in the gains realized from the special regulations.

There are many kinds of special regs, each designed to accomplish a different end. Success stories are common enough that more and more anglers are falling into the trap of wanting special regs where they aren't really needed. There is perhaps no better example of a river that does not need special regulations than southwestern Montana's Beaverhead River.

In response to flows that have created favorable conditions for spawning, trout populations in the Beaverhead have increased approximately fourfold since 1972. At the same time, average size has decreased slightly. DFWP biologists estimate the upper Beaverhead is supporting as many fish as it is capable of holding. This population expansion has occurred in spite of increasing fishing pressure under general regulations. It is unlikely that restrictive regulations would produce any more fish in the Beaverhead. More to the point, special regulations *could* even jeopardize the world-famous Beaverhead trophy trout fishery by reducing growth rates.

Montana is fortunate to have some very productive waters like the Beaverhead, Bighorn, and Missouri that can produce *trophy* trout as well as *many* trout. Better yet, they do it while allowing a normal harvest.

Special regulations have found their place in Montana. When they are properly applied, in the right place, they can result in spectacular increases in trout populations. As Montana's trout populations continue to enjoy the protection of various types of special regulations, perhaps a few more "Big Hole Monsters" will turn up. ■

Cloverleaf Lakes (photo: JIM PETERSON)

Tapeworms In Cloverleaf Lakes Cutthroat

by Jim Peterson

What is it about fishing that intrigues so many people? We all have our best excuses why those chores can wait until tomorrow, because today we're going fishing. It's a chance to get away, an opportunity to enjoy the outdoors, a chance to be with the family. Fishing provides all of this—and more. But why not hike or take a ride in the country? It's because of the surprise that only a hook at the end of a line can offer.

That initial tug on the line is probably one of fishing's most sought-after moments. The fisherman is waiting for a bite. Maybe he is after a particular fish he's battled before. But until he lands that fish, he has no way of knowing what is going to come out of the water. And it is that surprise that keeps most fishermen coming back time and time again.

Anyone who truly appreciates the mysteries of lakes and streams and the fish that live there also has concern for the other life that inhabits the aquatic environment. The insects on the water and the microorganisms and plants that balance the underwater lifeline are accepted and appreciated by most fishermen, although they may be unnoticed or taken for granted. Life forms that are *not* taken for granted are fish parasites.

A worm found while cleaning a fish is certainly unsightly, but it usually doesn't affect the quality of the flesh. It's unfortunate that some fishermen discard a good-eating fish after finding a worm or other parasite. Most people object to eating a wormy fish;

even though the parasite may not have been in the meat itself, one's psychological taste buds cry "Foul!" at the thought.

Although a few fish parasites in North America are also human parasites, these are rare and even these are easily killed by adequate cooking. To this author's knowledge, no human parasite infections resulting from eating a fish caught in Montana have been documented. Parasites seem more common in trash fish, like suckers, or warm water species, like bass. They are less common in trout, although several parasites utilize trout as hosts.

The Department of Fish, Wildlife and Parks investigates all parasite infestations brought to its attention. Most often, parasites are easily identified—if not the species, at least the type, so the potential threat to humans, and to the fish population, can be analyzed. The department appreciates parasite reports by fishermen, and they often provide helpful information about parasite distribution.

Fish parasites have been well described, and much is known about individual species. However, distribution of parasites, which is increasing, is not so well documented. And department biologists are always on the lookout for parasites known to infect humans.

One such parasite is *Diphyllobothrium latum,* the broad tapeworm. This parasite encysts in the meat of fish in a larval form (called a plerocercoid) and can develop into an adult in humans if an undercooked, infected fish is eaten. The broad tapeworm prefers pike and walleye, but it has been reported in many fish species, including trout. No reports of *D. latum* have been documented in Montana, although grizzly and black bears in the area of Yellowstone Lake in Yellowstone National Park in neighboring Wyoming are commonly infected with this, or a closely related species. Many species of *Diphyllobothrium* exist. The final host for most is fish-eating birds, or mammals other than man.

Diphyllobothrium tapeworms usually utilize three hosts in their life cycle. They live as adults in birds or mammals; they deposit eggs which leave the host with the feces. If the eggs are deposited in water, a free-swimming larval parasite (the coracidium) emerges. For the life cycle to continue, this form must be eaten by the next host, usually a tiny crustacean called a copepod. The parasite will develop in the copepod to the next larval stage (procercoid). If a fish then eats the copepod, the parasite may develop into a plerocercoid. A susceptible bird or mammal must then eat the fish for the life cycle to be completed.

JIM PETERSON

A department fisheries biologist examines a *Diphyllobothrium* tapeworm found in a cyst in a cutthroat trout taken from Cloverleaf lakes, a group of three small lakes in a remote area of the Beartooth Mountains. Preliminary evidence indicates this tapeworm is not the broad tapeworm, and that it is not a threat to humans.

In 1981, a species of *Diphyllobothrium* was discovered in a population of cutthroat trout in the Cloverleaf lakes, a group of three small lakes in a remote area of the Beartooth Mountains northeast of Cooke City. They are above the 10,000-foot level, and accessible only by a 6½-mile foot trail. Fishing pressure has been estimated at 15 to 20 people per year on these alpine lakes—lakes that aren't even appreciated by bears because they are so high.

Fishing is fairly good for 8- to 10-inch cutthroat and anglers may take an occasional 12- to 14-inch cutthroat. Cutthroat is the only species in the lakes, and 68% of them are infected with *Diphyllobothrium* tapeworms.

Biologists began a detailed preliminary study of this parasite in fall 1982. We collected live infected fish from the Cloverleaf lakes, carrying them out in backpacks filled with water. The fish were taken to the U.S. Fish and Wildlife Service Fish Cultural Development Center in Bozeman where they were held in tanks until they were needed for study. Laboratory work was conducted at the Marsh Veterinary Research Center at Montana State University. So far, much of the lab work has involved experimentally infecting lab animals to try to obtain adult worms which would aid in identifying the species, and determining the final host for this parasite.

Determination of a final host is an important goal and will be essential before biologists can evaluate which species of *Diphyllobothrium* we are dealing with. The fact that the Cloverleaf area lacks large mammals—such as bears—indicates that the natural final host may not be a mammal. A few birds inhabit the area, but due to the inaccessibility of the lakes most of the year, we do not know which birds might inhabit them seasonally. Ravens live in the rocky cliffs surrounding the lakes and are the prime suspects, although none have been examined yet.

Experimental infections in the lab resulted in successful cultivation of

only two adult *Diphyllobothrium* tapeworms, from two different hamsters. This could indicate that mammals are *not* a natural host of this *Diphyllobothrium*. However, no adult worms were obtained from infection experiments with three ducks and two pigeons. So, we still don't know how susceptible birds are to this parasite, nor do we know what the natural final host is.

Even though the species of this *Diphyllobothrium* has not yet been determined, evidence indicates this parasite is not the broad tapeworm *(D. latum)* and that it is not a threat to humans. Over 30 fish were examined in 1982, with 68% containing at least one larval tapeworm; the average fish contained four worms. Some worms were in tiny capsules attached to the stomach wall, while others were free in the body cavity. However, none were found in the edible portions of the fish. *D. latum* is often found in the flesh of fish; but the Cloverleaf *Diphyllobothrium* is not found in the meat, so it probably would never be consumed by humans.

The general appearance of the larval worm from Cloverleaf Lake cutthroat is similar to the broad tapeworm—as would be expected since they are both members of the same tapeworm family. However, their microscopic makeup is much different. These differences, along with comparison of the adult worms obtained from the hamsters with descriptions of adults of various other *Diphyllobothrium* species, will be the basis of further study to determine the species of this parasite.

We may never be able to determine with certainty the species of tapeworm infecting these fish. The many species of *Diphyllobothrium* are so similar that species determination is extremely difficult, even for professional parasitologists. However, maybe there are more important questions than exact name of the species. Do these worms harm the fish? Does this parasite exist in other lakes in the Beartooths?

As the study continues, we will try to answer these questions. But in the meantime, take along your frying pan, because the trout you catch in Montana are meant to be enjoyed. Any parasites you find on a fish can easily be removed when you clean it, and they won't affect quality of the meat as long as the fish is well cooked. Think of parasites like a bird nesting in a tree, or a flea on a dog—they just want a place to call home. Fish parasites are simply part of the aquatic life that makes up that underwater world in which we fishermen find so much pleasure. They can be a nuisance, but so are scales. For that matter, so is mowing the lawn. So let's go fishing.

• *The Cloverleaf lakes* Diphyllobothrium *study is being conducted by the Montana Department of Fish, Wildlife and Parks in close cooperation with Dr. David E. Worley, Marsh Veterinary Research Center, Montana State University. The assistance of Dr. Worley and the parasitology staff at the center, and the help of the personnel at the U.S. Fish and Wildlife Service Fish Cultural Development Center in Bozeman is greatly appreciated.*—Jim Peterson ■

Book Reviews

• *The following books, published originally by Amwell Press in 1982 as custom-bound, signed, and numbered limited editions of no more than 1,000 copies, have now been released in first trade editions. Designed by Monica Sullivan, they are printed on acid-free paper with cloth bindings.*—Ed.

STRAYED SHOTS AND FRAYED LINES, edited by John E. Howard, Amwell Press, Inc., 65 Old Route 22; Clinton, NJ 08809, 407 pages, $25, hard cover.

"Strayed Shots and Frayed Lines" is a smorgasbord of American sporting humor; while the stories cover everything from poolrooms to wedding gifts and bird dogs to bonefish, they all revolve around sporting endeavors in the out-of-doors. Some of them date back as far as the mid-1800s, while others are written by contemporary authors. One thing is certain: If you like the outdoors and also like to have your funny bone tickled, these yarns will give you many hours of reading enjoyment. And if you are even casually acquainted with sporting literature, you will recognize many of the names in this collection—Corey Ford, Havilah Babcock, Robert Ruark, Ed Zern, Patrick McManus, Joel Vance, and Gene Hill, to name a few.

As Gene Hill says in his foreword, "John Howard has just added a new and very welcome 'how to' book to my library. It's about the one thing most of us need to know more about—how to laugh. It's long been a contention of mine that too many of us take ourselves and our outdoor messing around far more seriously than our talents deserve. So for those of us—and we have to number in the millions—who are indifferent shots, pathetic fishermen, and have dogs and experiences to match, John has dug up the finest chroniclers of similar incapable sportsmen....So sit down, put your glass where you won't knock it over, and have an absolutely marvelous and soul-restoring evening of laughter."—*Dave Books*

THE DUCK HUNTER'S BOOK, edited by Lamar Underwood, Amwell Press, Inc., 65 Old Route 22; Clinton, NJ 08809, 609 pages, $30, hard cover.

Although it contains its share of factual and useful information about ducks and duck hunting, "The Duck Hunter's Book" is not a how-to manual for waterfowlers. Instead, it is a celebration of the rich and time-honored tradition of duck hunting. If you are one of those lucky people who would rather be hunkered in a duck blind than anchored in front of a television set, you will enjoy this book.

As editor Lamar Underwood says in his introduction, "Ducks are a kind of magic, they come to us from the secret faraway places of their summers, riding the winds of seasonal renewal, stirring and rekindling the fires in our hunters' hearts. In late summer we pore eagerly over scouting reports, seeking some clues of the numbers to come. Will this be the year of the many, or the few? In early season we enjoy local birds as much as possible, still waiting for the curtain to go up on The Big Show. Then, somewhere to the north, the mercury is plunging, winds are stirring through the marsh grasses, and the flight is on. This is a book about that tapestry...."

Among the many fine authors represented in this anthology are Ted Trueblood, John Madson, Ray Holland, Gordon MacQuarrie, Charles F. Waterman, Jim Rikhoff, Nelson Bryant, Norm Strung, and the dean of all duck hunters, Nash Buckingham. It's a book guaranteed to make the long wait between waterfowling seasons go a lot faster.—*Dave Books*

black-footed ferret (photo: DEAN BIGGINS)

Montana: Crucial Key To Ferret Recovery

by Dennis L. Flath and Tim W. Clark

The problem of finding the proverbial needle in a haystack is further complicated when one doesn't know in which haystack to look. But one night in early fall of 1981, a Wyoming ranch dog found both when it killed a tan-colored, minklike animal in the front yard of a ranch home. Three weeks later, a cowboy saw another one, alive this time. The result was discovery of the only known population of black-footed ferrets.

The scarcity of the black-footed ferret in recent decades has been a frustrating and perplexing problem to those interested in locating and conserving this critically endangered species. For a time, because no ferrets could be found, some biologists were ready to throw in the towel and declare the ferret extinct. In 1964, a ferret population had been found in South Dakota, but that population had gradually dwindled. By late 1974, the South Dakota ferrets could no longer be located; it looked as if the ferret had gone the way of the passenger pigion.

However, the 1981 discovery near Meteetsee, Wyo., brought renewed hope that this species—among the rarest of the rare—could be saved. Studies of this now-famous ferret population continue, and those interested are much more optimistic about the future of the ferret than they were just a few short years ago. And, Montana could hold a crucial key to unlocking the door to ferret recovery.

The sleek black-footed ferret, an agile predator of prairie dogs, once resided in much of a 12-state area and parts of two Canadian provinces. Since 1851, when John James Audubon and his naturalist companion John Bachman first described the species, only about 1,000 reports of live black-footed ferrets have been made (other ferrets may have been seen, but not reported). Nocturnal in habits and mostly subterranean while hunting and resting, the ferret—needless to say—was seldom seen even in areas where it was probably common. Museums contain some 190 specimens, and only about 24 were ever taken into captivity. In 1900, over 120 million acres of land inhabited by prairie dogs provided habitat for this prairie predator. Today, black-footed ferret numbers and range have been drastically reduced by habitat loss and by direct and indirect killing.

Although Wyoming's black-footed ferret population is holding its own, it is still the only *known* population and the ferret is still very much an endangered species. Having only a single small population is like having all of your eggs in one basket. Disease or some other catastrophe could wipe it out entirely. The Meteetsee discovery is a crucial start in saving the ferret, but it is only the beginning. Other populations must be found—and the sooner the better.

Which state of the 12 formerly containing ferrets would be the most likely still to have ferrets today? Montana heads the list. In a compilation of ferret sightings from 1948-53, Victor Cahalane, writing for the American Society of Mammalogists, found that South Dakota led with 16 sightings, followed by Montana with eight, and Nebraska with seven. Even though more sightings were noted in South Dakota than in Montana, biologists still perceive Montana as the "best bet" for possibly finding ferrets: It is a rich storehouse of new ferret ground.

In 1983, a more complete look at historical information showed that 39 ferret specimens have been obtained in Montana. All but three of these were recorded from 1915-53. Rosebud County produced eight, while Powder River County yielded six, Garfield county five, and Big Horn County four. Eleven other counties were the source of one or two records each. In addition, confirmed sightings over the years provide some evidence that ferrets continue to exist in Montana.

Of the recent ferret sightings, few have been followed up adequately due to funding limitations. But this backlog of unconfirmed ferret sightings provides a starting point for ferret searches.

Results from the Meteetsee ferret studies, under way for about two years, have brought much new information about ferrets and their habitat needs to light. The study's two major goals are (1) to conserve this population, and (2) to ultimately discover and aid in the recovery of several other healthy populations. The first goal includes locating as many ferrets as possible each winter and summer at the Meteetsee site; determining litter sizes, distribution, and habitat requirements, and identifying what is needed to ensure continued survival. In addition, a key objective is to develop better methods for locating ferrets elsewhere. All of these goals have been set within the framework of a close working relationship with Meteetsee area ranchers—which has proved satisfactory to biologists and ranchers alike.

Over 130 different ferrets have been seen in the Meteetsee study area, with all but two at prairie dog towns. Most sightings have been at night when ferrets hunt prairie dogs. (In summer, however, biologists have also seen ferrets hunting prairie dogs during early morning daylight hours.) Ferrets investigate many prairie dog holes by descending for a few minutes, then emerging and moving on to another hole. If they do not come back up, they have prob-